

ONKYO SERVICE MANUAL

QUARTZ SYNTHESIZED TUNER AMPLIFIER MODEL TX-SV303PRO



Black model

| | |
|--------------------------|---------------|
| BHMD, BHMDN, BHUD, BHUDN | 120V AC, 60Hz |
|--------------------------|---------------|

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK Δ ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

ONKYO
AUDIO COMPONENTS

SPECIFICATIONS

AMPLIFIER SECTION

| | |
|----------------------------|---|
| Power Output: | Stereo mode 80 watts per channel min. RMS. at 8 ohms, both channels driven, from 20Hz to 20,000Hz, with no more than 0.08% total harmonic distortion. Surround/Multi mode 75 watts per channel min. RMS. at 8 ohms both channels driven, from 20Hz to 20,000Hz, with no more than 0.08% total harmonic distortion. (FRONT) 12 watts per channel min. RMS. at 8 ohms 1,000Hz with no more than 0.8% total harmonic distortion. (REAR or REMOTE) |
| Total Harmonic Distortion: | 0.08% at rated power (FRONT) |
| IM Distortion: | 0.08% at rated power (FRONT) |
| Damping Factor: | 60 at 8 ohms (FRONT) |
| Sensitivity and Impedance: | Phono: 2.5mV/50 kohms CD/Tape Play: 150mV/50 kohms Tape Rec: 150mV/2.2 kohms Pre out (CENTER): 1V, 2.2 kohms |
| Phono Overload: | 120mV RMS. at 1,000 Hz, 0.08 % THD. |
| Frequency Response: | 20 to 30,000 Hz, +/-1 dB |
| RIAA Deviation: | 20 to 20,000 Hz, +/-0.8 dB |
| Tone Control: | BASS: +/-10 dB at 100 Hz TREBLE: +/-10 dB at 10,000 Hz |
| Signal to Noise Ratio: | PHONO: 80 dB (IHF A, 5mV input) CD/TAPE: 100 dB (IHF A) |
| Muting: | - ∞ dB |

VIDEO SECTION

Signal sensitivity and impedance
VDP/VCR normal input, output: 1 Vp-p, 75 ohms

TUNER SECTION

| | | | |
|--------------------------------|--|----------------------------|-----------------------------|
| FM: | | AM: | |
| Tuning Range: | 87.5 – 108.0MHz (100kHz steps) | Tuning Range: | 530 – 1710kHz (10kHz steps) |
| Usable Sensitivity: | Mono: 11.2dBf, 2.0μV Stereo: 17.2dBf, 4.0μV | Usable Sensitivity: | 30μV |
| 50dB Quieting Sensitivity: | Mono: 17.2dBf, 4.0μV Stereo: 37.2dBf, 40μV | Image Rejection Ratio: | 40dB |
| Capture Ratio: | 1.5dB | IF Rejection Ratio: | 40dB |
| Image Rejection Ratio: | 40dB | Signal-to-Noise Ratio: | 40dB |
| iF Rejection Ratio: | 90dB | Total Harmonic Distortion: | 0.7% |
| Signal-to-Noise Ratio: | Mono: 73dB Stereo: 67dB | | |
| Alternate Channel Attenuation: | 55dB | | |
| AM Suppression Ratio: | 50dB | | |
| Total Harmonic Distortion: | Mono: 0.15% Stereo: 0.25% | | |
| Frequency Response: | 30 – 15,000Hz ±1.5dB | | |
| Stereo Separation: | 45dB at 1kHz/30dB at 100 – 10,000Hz | | |
| Muting Level: | 17.2dBf, 4μV | | |

GENERAL

| | |
|-------------------------|---|
| Power Supply: | AC120V, 60Hz |
| Dimensions (W x H x D): | 455 x 140 x 331.5 mm 17-15/16" x 5-7/8" x 13-1/16" |
| Weight: | 9.9kg (21.8lbs) |

SERVICE PROCEDURES

1. Replacing the fuses

For continued protection against fire hazard, replace only with same type and same rating fuse.

| Circuit no. | Part no. | Description |
|-------------|----------|-------------------------|
| F901 | 252051 | △ 6A ST-6, Primary fuse |
| F904, F905 | 252051 | 6A ST-6, Secondary fuse |

2. Change of FM/AM band step.

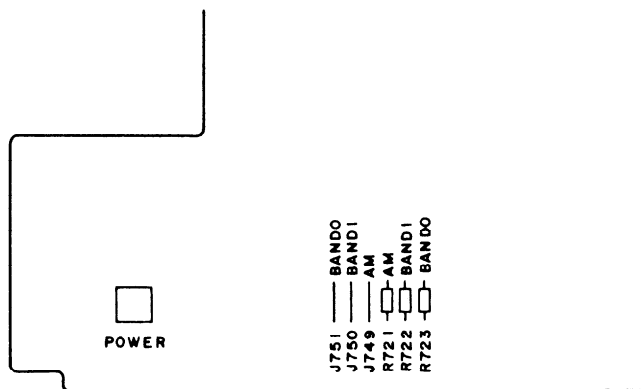
(FM)

| BAND STEP | R723 | J751 |
|--------------|------------|-------|
| 100kHz→50kHz | Addition | Open |
| 50kHz→100kHz | Eliminated | Short |

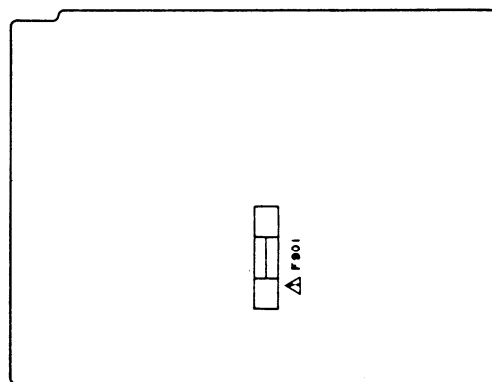
(AM)

| BAND STEP | R721 | J749 |
|------------|------------|-------|
| 10kHz→9kHz | Eliminated | Short |
| 9kHz→10kHz | Addition | Open |

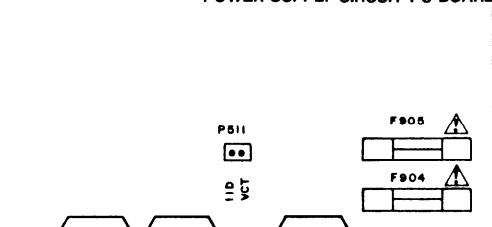
In R721 and R723 Carbon resistor 100kΩ (Part No.417341044) are used.



DISPLAY CIRCUIT PC BOARD



POWER SUPPLY CIRCUIT PC BOARD



SELECTOR AND POWER AMPLIFIER PC BOARD

3. Memory preservation

This unit does not require memory preservation batteries. A built-in memory power back-up system preserves contents of the memory during power failures and even when the unit is unplugged. The unit must be plugged in and the power switch turned on and off once in order to charge the back-up system. Note that since this is not a permanent memory the power switch must be turned on and off a few times each month to keep the back-up system operative. The period of time during which memory contents are preserved after power has last been turned off varies depending on climate and placement of the unit. On the average, memory contents are protected over a period of 3 to 4 weeks (a minimum of 2 weeks) after the last time power has been turned off. This period is shorter when the unit is exposed to very high humidity or used in an area with an extremely humid climate.

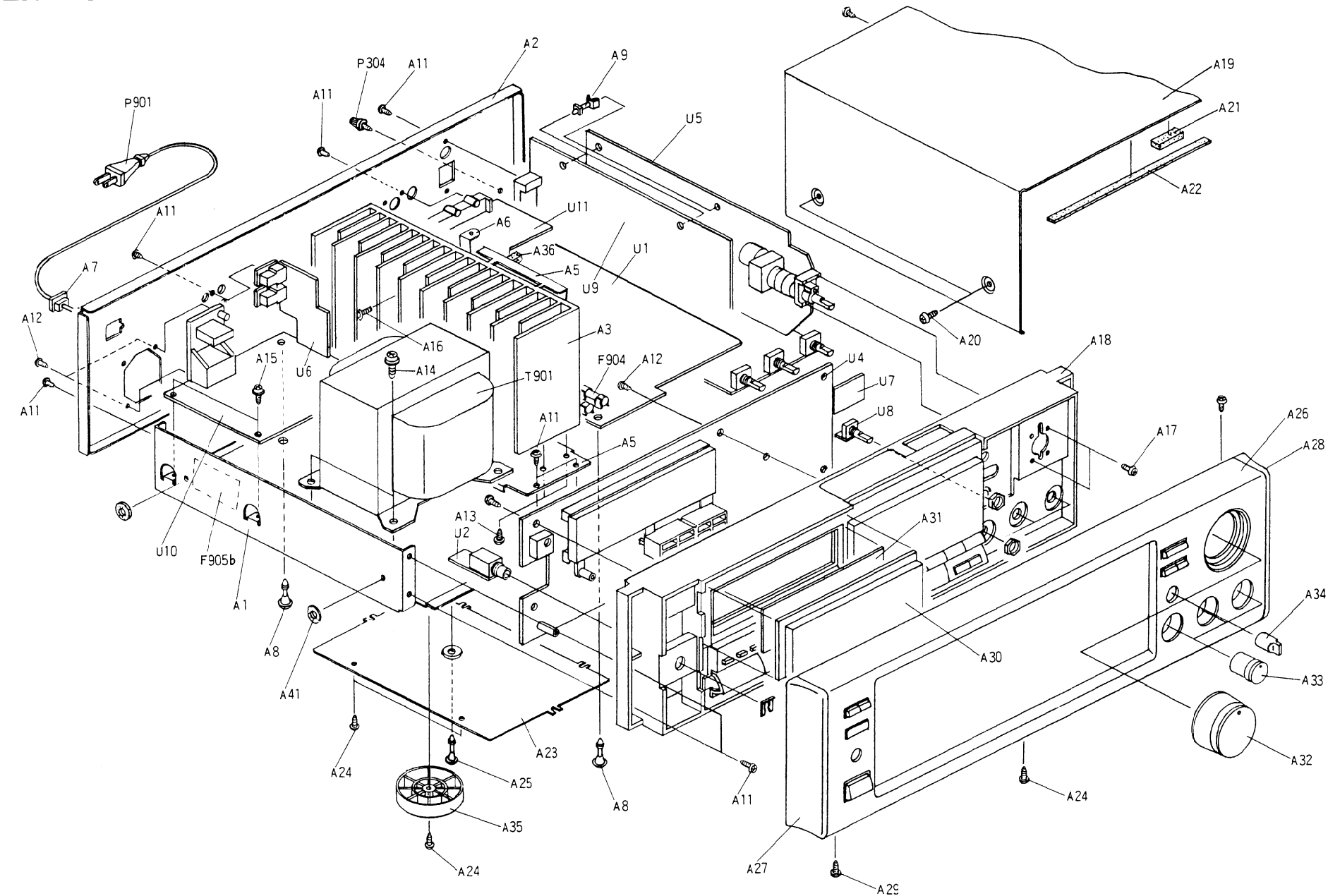
4. Safety-check out

(Only U.S.A. model)








After correcting the original service problem perform the following safety check before releasing the set to the customer.


Connect the insulating-resistance tester between the plug of power supply cord and terminal GND on the back panel. Specifications: 3.3 Mohm ±10% at 500V.

EXPLODED VIEW

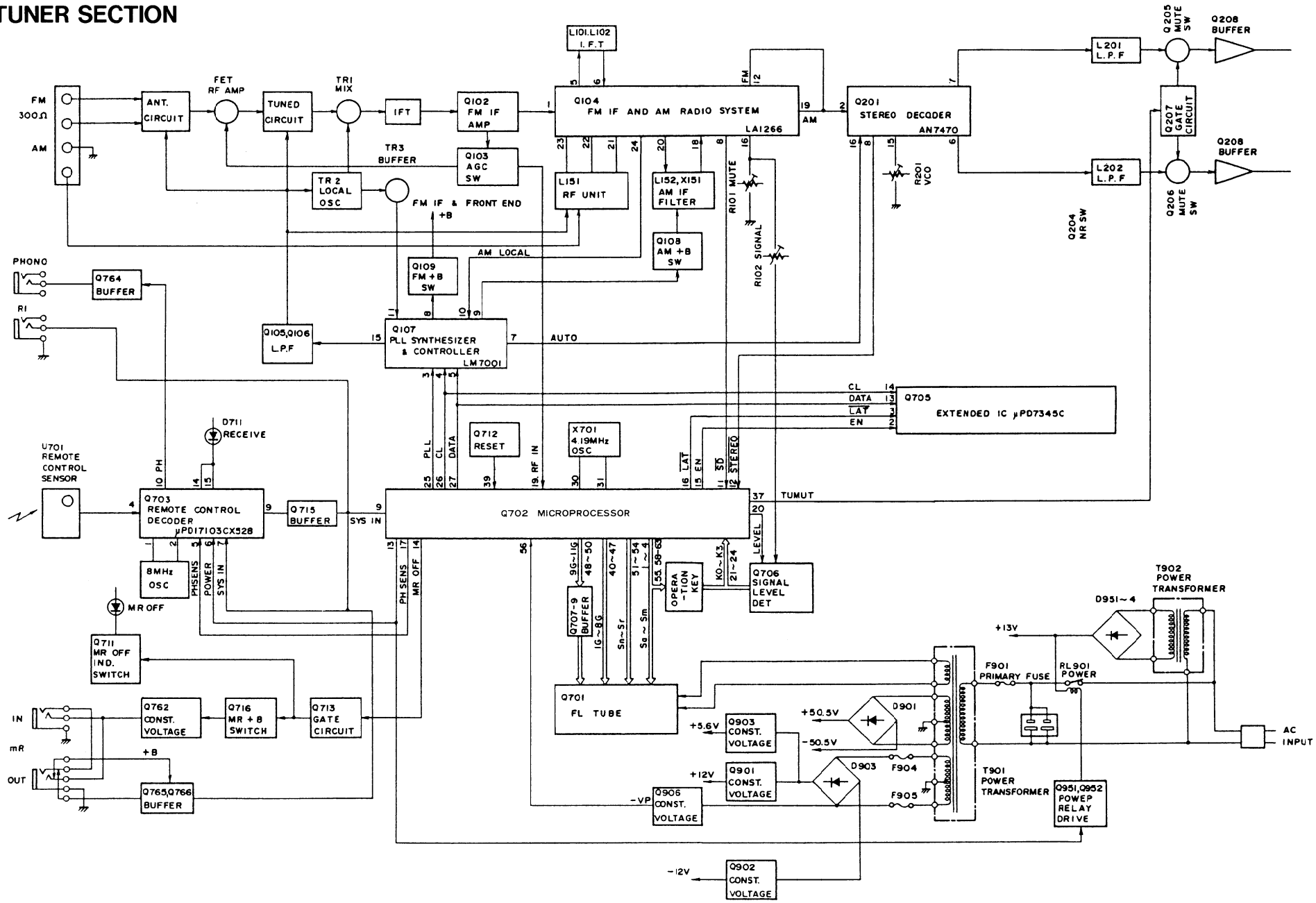


PARTS LIST

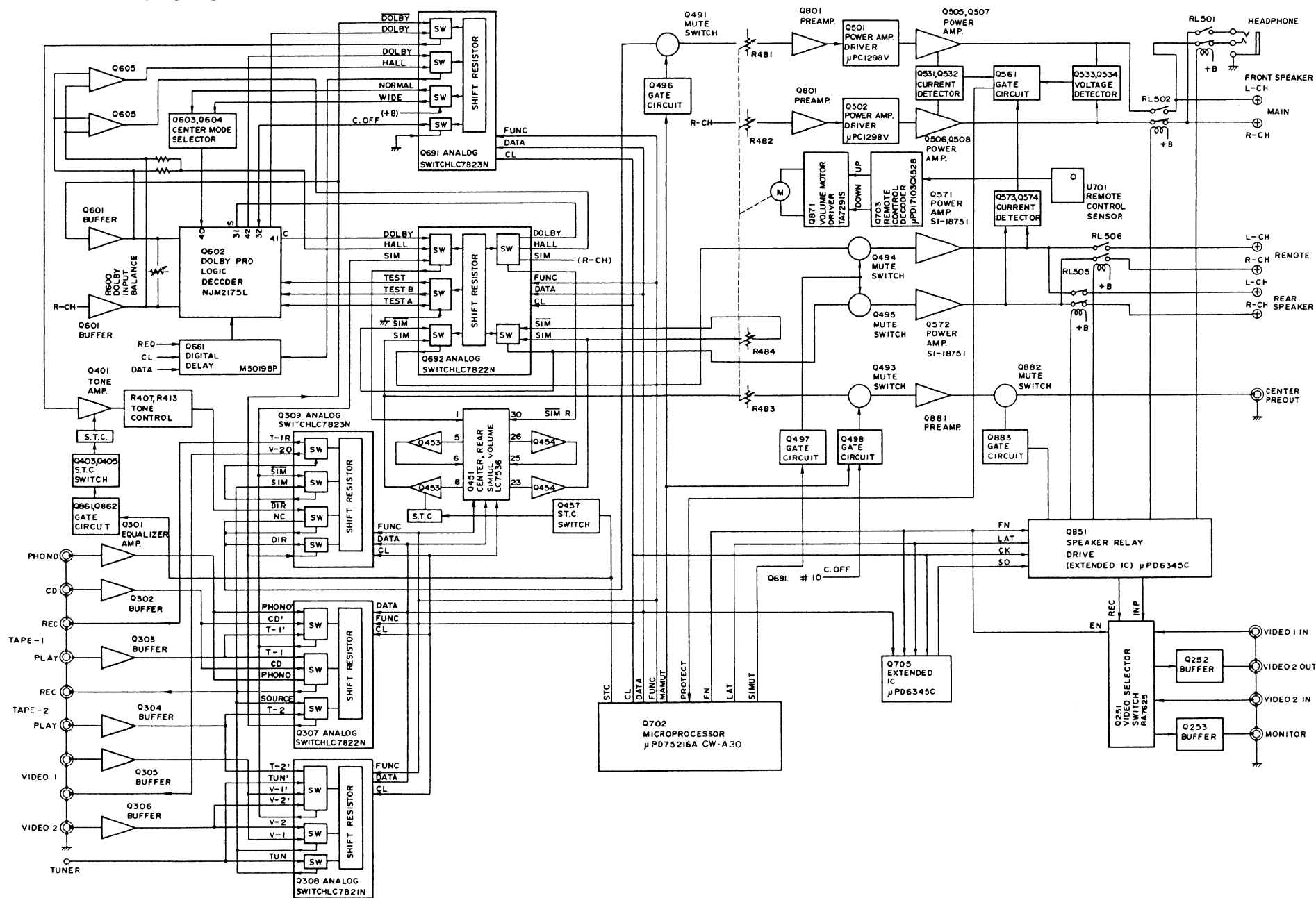
| REF. NO. | PART NO. | DESCRIPTION | REF. NO. | PART NO. | DESCRIPTION |
|----------|---------------------------|---|-----------|------------|---|
| A1 | 27100239AY | Chassis | F901 | 252051 |  6A ST-6,Primary fuse |
| A2 | 27121616Y | Rear panel | F904 | 252051 |  6A ST-6,Secondary fuse |
| A3 | 27160287 | Radiator | F905 | 252051 |  6A ST-6,Secondary fuse |
| A4 | 27141474AY | Bracket SH | F905b | 29360626-1 | Rating label, fuse |
| A5 | 27130653Y | Bracket H | JL701 | 2041322010 | NCFC1-322010,Flat cable |
| A6 | 27141498Y | Bracket S | P304 | 25060044 | Terminal GND |
| A7 | 27300750 |  Bushing | P901 | 253163Y or |  AS-UC-6 #18, |
| A8 | 27190657 | KGLS-18RT,Holder | | 253174Y |  Power supply cord |
| A9 | 27190062 | KGLS-12S,Holder | Q505,Q506 | 2201653, | 2SC3856-O, |
| A10 | 801433 | 3SMS10W.SW+14B(BC),Sems self-tapping screw | | 2201654, | 2SC3856-Y, |
| A11 | 834430088 | 3TTS+8B(BC),Self-tapping screw | | 2201655, | 2SC3856-P, |
| A12 | 833430080 | 3TTP+8B(BC),Self-tapping screw | | 2202272 or | 2SC3907-R or |
| A13 | 834430108 | 3TTS+10B(BC),Self-tapping screw | | 2202273 | 2SC3907-O,Power amplifier transistors |
| A14 | 830440089 | 4TTC+8C(BC),Self-tapping screw | Q507,Q508 | 2201663, | 2SA1492-O, |
| A15 | 831130088 | 3TTW+8B,Self-tapping screw | | 2201664, | 2SA1492-Y, |
| A16 | 82143015 | 3P+15FN(BC),Pan head screw | | 2201665, | 2SA1492-P, |
| A17 | 82143006 | 3P+6FN(BC),Pan head screw | | 2202262 or | 2SA1516-R or |
| A18 | 27110718Y | Front bracket ass'y | | 2202263 | 2SA1516-O,Power amplifier transistors |
| A19 | 28184476AY | Top cover | T901 | 2300666 |  NPT-1110D,Power transformer |
| A20 | 834430088 | 3TTS+8B(BC),Self-tapping screw | U1 | 1A377587-5 | NAAF-4187-5,Selector and power amplifier pc board ass'y |
| A21 | 28141132 | 6×60×40,Cushion | U2 | 1A377588-5 | NAETC-4188-5,Headphone terminal pc board ass'y |
| A22 | 28141132 | 0.5×390×14,Cushion | U4 | 1A377589-5 | NADIS-4189-5,Display circuit pc board ass'y |
| A23 | 27170280AY | Bottom panel | U5 | 1A377590-5 | NAAF-4190-5,Volume circuit pc board ass'y |
| A24 | 834430088 | 3TTS+8B(BC),Self-tapping screw | U6 | 1A377591-5 | NADG-4191-5,RI/MR terminal pc board ass'y |
| A25 | 27190657 | KGLS-18RT,Holder | U7 | 1A377592-5 | NASW-4192-5,Operation switch pc board ass'y |
| A26 | 1A377701K | Front panel ass'y | U8 | 1A377593-5 | NAETC-4193-5,Input balance volume pc board ass'y |
| A27 | 28125234BY | End cap L | U9 | 1A377594-5 | NARF-4194-5,Tuner circuit pc board ass'y |
| A28 | 28125235BY | End cap R | U10 | 1A377595-5 | NAPS-4195-5,Power supply circuit pc board ass'y |
| A29 | 833430080 | 3TTP+8B(BC),Self-tapping screw | U11 | 1A377596-5 | NAAF-4196-5,Video and sub amplifier pc board ass'y |
| A30 | 28191596A | Clear plate | | | |
| A31 | 28133262Y | Back plate | | | |
| A32 | 28324372 | Knob VOLUME | | | |
| A33 | 28324376A | Knob TONE | | | |
| A34 | 28324378 | Knob IB | | | |
| A35 | 27175251 or 27175251-1 | Leg | | | |

NOTE:
THE COMPONENTS IDENTIFIED BY MARK  ARE
CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK.
REPLACE ONLY WITH PART NUMBER SPECIFIED.

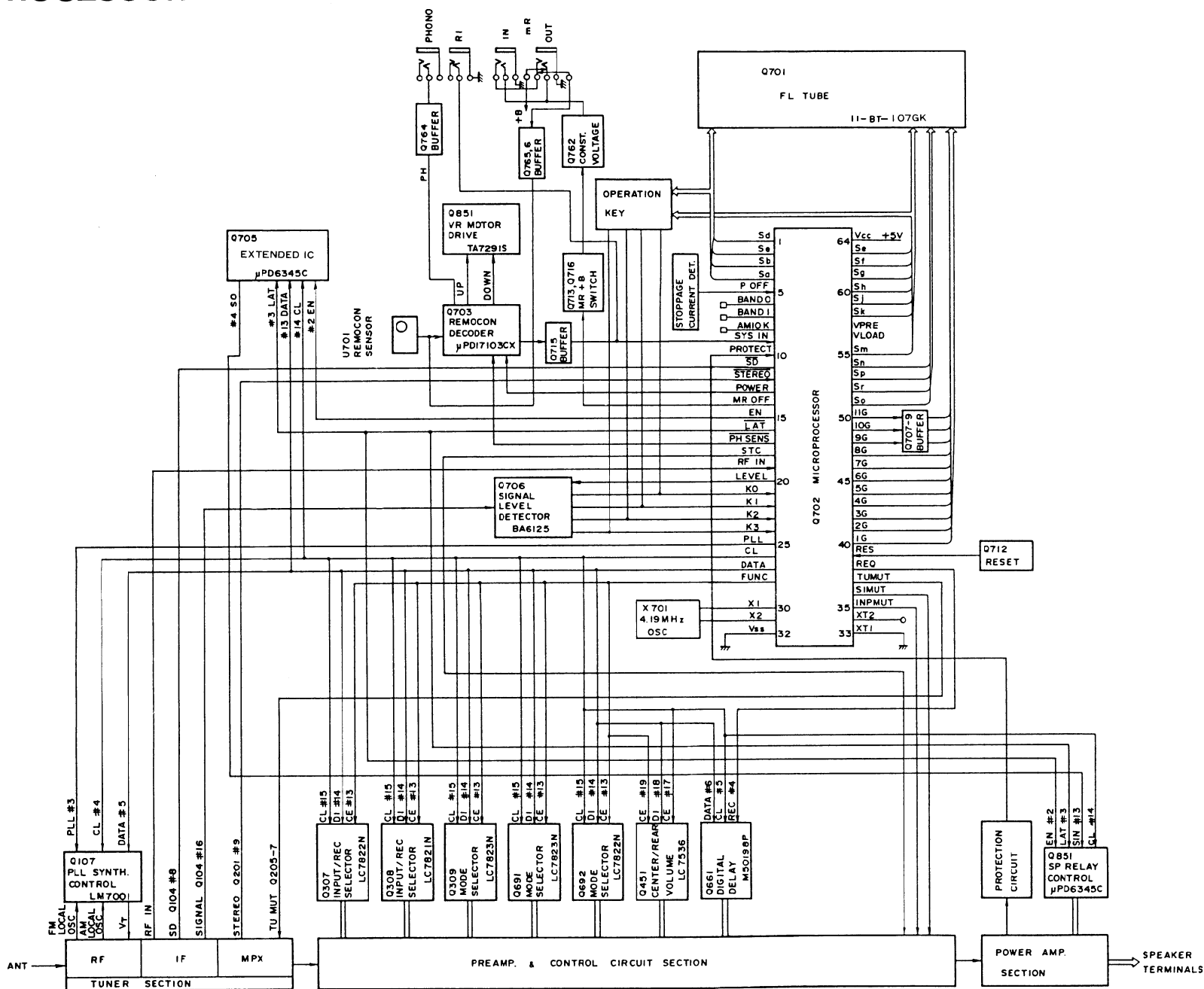
BLOCK DIAGRAM TUNER SECTION



BLOCK DIAGRAM AMPLIFIER SECTION



MICROPROCESSOR DESCRIPTIONS



Terminal Description

| Pin No. | Symbol | Description | | | | | | | | | | | | |
|----------------|--------------|--|----------------|--------------|------|--------|----|--------|-------|--------|----------|--------|-------------|--------|
| 1 | Sd | Segment and key scan output terminals. "H" when active. | | | | | | | | | | | | |
| 2 | Sc | | | | | | | | | | | | | |
| 3 | Sb | | | | | | | | | | | | | |
| 4 | Sa | | | | | | | | | | | | | |
| 5 | POFF | This is the input terminal for detection of the stoppage of electric current. "L" when the stoppage of electric current. | | | | | | | | | | | | |
| 6 | BAND0 | Initializing input terminal for region setting of FM band. | | | | | | | | | | | | |
| 7 | BAND1 | | | | | | | | | | | | | |
| 8 | AM 10K | Initializing input terminal for region setting of AM band. | | | | | | | | | | | | |
| 9 | SYS IN | System code input terminal. "H" when active. | | | | | | | | | | | | |
| 10 | PROTECT | Protection circuit operation detection input terminal. "H" when active. | | | | | | | | | | | | |
| 11 | SD | Broadcast detection input terminal. "L" when active. Control the stop of auto tuning and output TU MUT(#37). | | | | | | | | | | | | |
| 12 | STEREO | Stereo broadcast detection input terminal. "L" when stereo broadcast. | | | | | | | | | | | | |
| 13 | POWER | Power control output terminal. "H" when the power turns on. | | | | | | | | | | | | |
| 14 | MR | MR control output terminal. "H" when MR turns on. | | | | | | | | | | | | |
| 15 | EN | Connect the terminal EN of the extended IC μ PD6345C.(Q705,Q851) | | | | | | | | | | | | |
| 16 | LAT | Connect the terminal LAT of the extended IC μ PD6345C. | | | | | | | | | | | | |
| 17 | PHONO | Phono control output terminal. | | | | | | | | | | | | |
| 18 | S.TONE | SELECTIVE TONE control output terminal. "H" when this switch turns on. | | | | | | | | | | | | |
| 19 | RF IN | RF mode input terminal. <table border="1"><tr><td>RF IN</td><td>RF MODE</td></tr><tr><td>L</td><td>LOCAL</td></tr><tr><td>H</td><td>DX</td></tr></table> Control the terminals LOCAL and DX of the extended IC. | RF IN | RF MODE | L | LOCAL | H | DX | | | | | | |
| RF IN | RF MODE | | | | | | | | | | | | | |
| L | LOCAL | | | | | | | | | | | | | |
| H | DX | | | | | | | | | | | | | |
| 20 | LEVEL | Signal level input control output terminal.The signal level is inputted to terminals K0-K3 when this terminal is the high level. | | | | | | | | | | | | |
| 21 | K0 | Key scan input terminals when pin 20 is low. "H" when active. Signal level input terminal when pin 20 is high. <table border="1"><tr><td>Key input of L</td><td>Signal level</td></tr><tr><td>none</td><td>LEVEL0</td></tr><tr><td>K0</td><td>LEVEL1</td></tr><tr><td>K0,K1</td><td>LEVEL2</td></tr><tr><td>K0,K1,K2</td><td>LEVEL3</td></tr><tr><td>K0,K1,K2,K3</td><td>LEVEL4</td></tr></table> | Key input of L | Signal level | none | LEVEL0 | K0 | LEVEL1 | K0,K1 | LEVEL2 | K0,K1,K2 | LEVEL3 | K0,K1,K2,K3 | LEVEL4 |
| Key input of L | Signal level | | | | | | | | | | | | | |
| none | LEVEL0 | | | | | | | | | | | | | |
| K0 | LEVEL1 | | | | | | | | | | | | | |
| K0,K1 | LEVEL2 | | | | | | | | | | | | | |
| K0,K1,K2 | LEVEL3 | | | | | | | | | | | | | |
| K0,K1,K2,K3 | LEVEL4 | | | | | | | | | | | | | |
| 22 | K1 | | | | | | | | | | | | | |
| 23 | K2 | | | | | | | | | | | | | |
| 24 | K3 | | | | | | | | | | | | | |
| 25 | PLL | Connect to the terminal CE of PLL IC (LM7001 Q107). | | | | | | | | | | | | |
| 26 | CL | Connect to the terminal CL of PLL IC,terminal CL of analogue switches(Q307,308, Q309,Q601,Q692),terminal SECK of digital delay (Q661) and terminal CLK of electro volume. (Q451) | | | | | | | | | | | | |
| 27 | DATA | Connect to the terminal DATA of PLL IC,terminal DI of analogue switches,terminal SEDATA of digital delay,terminal SIN of extended IC and terminal CLK of electro volume. (Q451) | | | | | | | | | | | | |

FM band setting

| BAND1 | BAND0 | REGION | FREQUENCY RANGE | CH. SPACE |
|-------|-------|--------------|-----------------|-----------|
| 0 | 0 | U.S.A. | 87.5-108.0MHz | 50kHz |
| 0 | 1 | Europe | 87.50-108.00MHz | 50kHz |
| 1 | 0 | Saudi Arabia | 87.50-108.00MHz | 50kHz |
| 1 | 1 | Japan | 76.0-90.0MHz | 100kHz |

AM band setting

| AM10K | REGION | FREQUENCY RANGE | CH. SPACE |
|-------|--------------|-----------------|-----------|
| 1 | U.S.A. | 530-1710kHz | 10kHz |
| 0 | Saudi Arabia | 531-1602kHz | 9kHz |
| 0 | Europe | 522-1611kHz | 9kHz |

| Pin No. | Symbol | Description |
|---------|----------|--|
| 28 | CE | Connect to the terminal CE of analogue switches and terminal CE of electro volume. |
| 29 | LED | LED indicator control output terminal. |
| 30 | X1 | Ceramic oscillator connection terminal for main system clock. |
| 31 | X2 | |
| 32 | VSS | Ground terminal. |
| 33 | XT1 | Ceramic oscillator connection terminal for sub system clock. |
| 34 | XT2 | |
| 35 | INP MUT | Audio muting output terminal when input selector change over. |
| 36 | SIM MUT | SIM muting output terminal when input selector change over. |
| 37 | TU MUT | Tuner muting output terminal."H" when active. |
| 38 | REQ/MODE | Connect to the terminal REQ of digital delay. |
| 39 | RESET | Reset input terminal."L"when active. |
| 40 | D1 | Digit output terminals."H" when active. |
| 41 | D2 | |
| 42 | D3 | |
| 43 | D4 | |
| 44 | D5 | |
| 45 | D6 | |
| 46 | D7 | |
| 47 | D8 | |
| 48 | D9 | |
| 49 | D10 | |
| 50 | D11 | |
| 51 | So | Segment output terminals."H" when active. |
| 52 | Sr | |
| 53 | Sp | |
| 54 | Sn | |
| 55 | Sm | |
| 56 | VLOAD | Pull-down resistor connection terminal of FIP controller/driver. |
| 57 | VPRE | Power supply terminal of output buffer of FIP controller/driver. |
| 58 | Sk | Segment and key scan output terminals. "H" when active. |
| 59 | Sj | |
| 60 | Sh | |
| 61 | Sg | |
| 62 | Sf | |
| 63 | Se | |
| 64 | VDD | Power supply terminal.(+5V) |

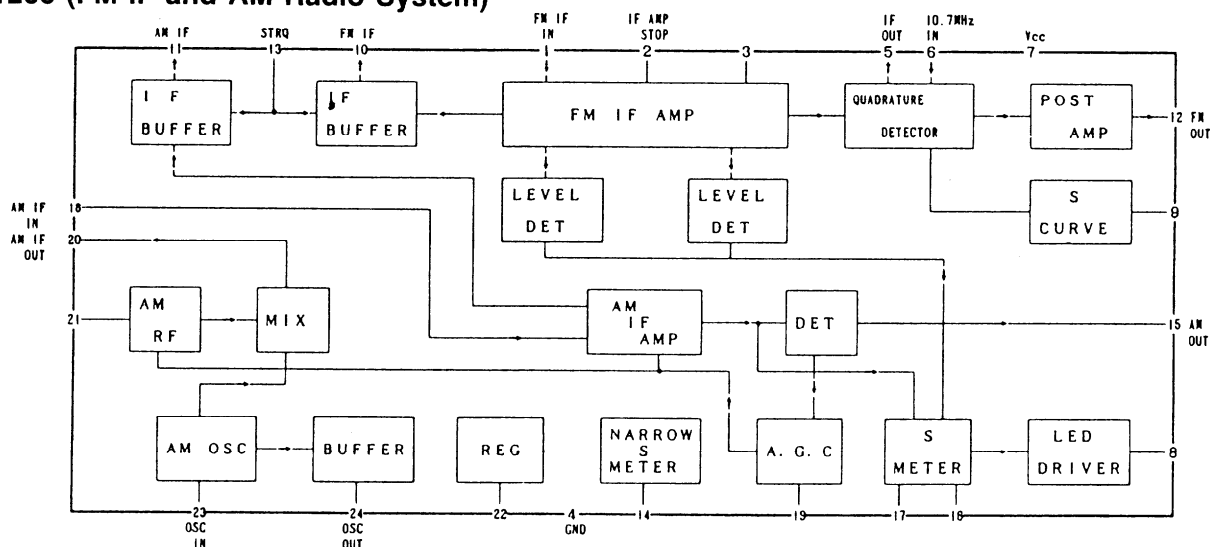
Key Matrix

| | No. | 24 | 23 | 22 | 21 |
|-----|-----|------------|----------------|--------------|-----------|
| No. | | K3 | K2 | K1 | K0 |
| 4 | Sa | SLEEP | SPEAKER REMOTE | SPEAKER MAIN | POWER |
| 3 | Sb | DELAY TIME | SURROUND MODE | CENTER MODE | MR |
| 2 | Sc | TAPE-2 | TAPE-1 | VIDEO-2 | VIDEO-1 |
| 1 | Sd | CD | PHONO | AM | FM |
| 63 | Se | | S.DIRECT | SIM | REC OUT |
| 62 | Sf | 4 | 3 | 2 | 1 |
| 61 | Sg | 8 | 7 | 6 | 5 |
| 60 | Sh | CLASS SCAN | D.TUNING | 0 | 9 |
| 59 | Sj | UP | DOWN | MEMORY | MUTE/MODE |
| 58 | Sk | CLASS-D | CLASS-C | CLASS-B | CLASS-A |
| 55 | Sm | CENTER OFF | SELECTIVE TONE | CLASS-F | CLASS-E |

IC BLOCK DIAGRAMS AND DESCRIPTIONS

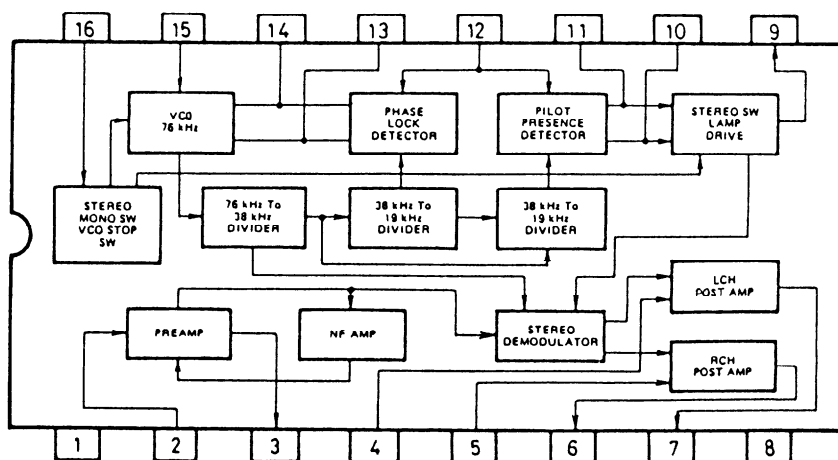
Q104

LA1266 (FM IF and AM Radio System)



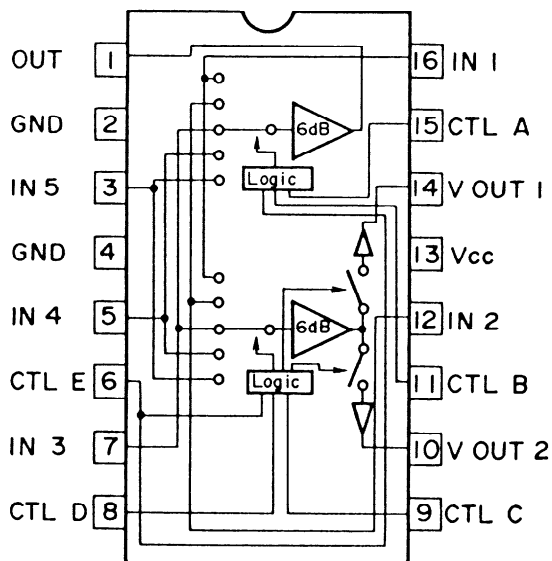
Q201

AN7470 (FM Stereo Decoder)



Q251

BA7625 (Video Selector Switch)



| #15 | #11 | #6 | #1 |
|-----|-----|----|-------------|
| A | B | E | MONITOR OUT |
| L | L | X | IN1 |
| H | L | X | IN2 |
| L | H | X | IN3 |
| H | H | L | IN4 |
| H | H | H | IN5 |

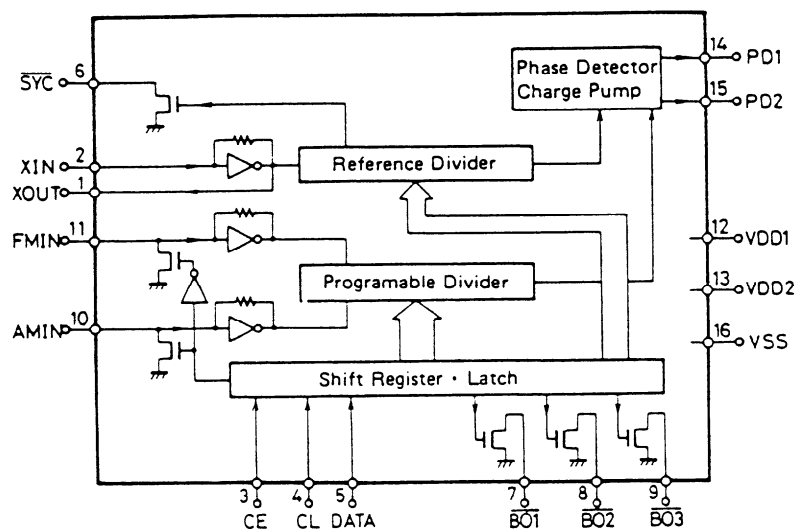
X: Don't care

| #9 | #8 | #6 | #14 |
|----|----|----|--------|
| C | D | E | VOUT 1 |
| L | L | X | |
| H | L | X | IN2 |
| L | H | X | IN3 |
| H | H | L | IN4 |
| H | H | H | IN5 |

| #15 | #11 | #6 | #10 |
|-----|-----|----|--------|
| A | B | E | VOUT 2 |
| L | L | X | IN1 |
| H | L | X | |
| L | H | X | IN3 |
| H | H | L | IN4 |
| H | H | H | IN5 |

Q107

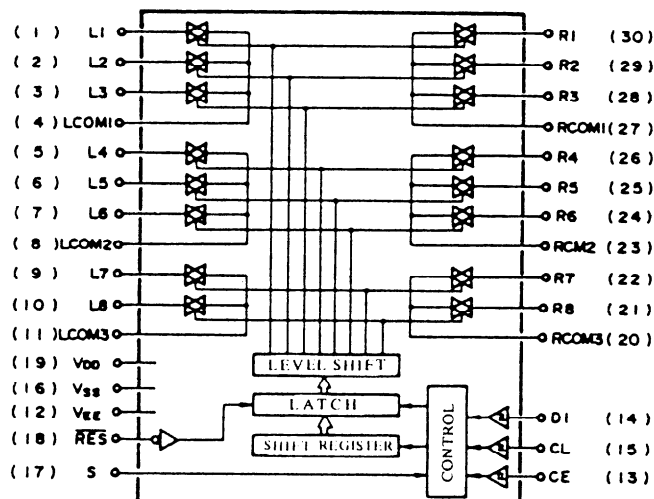
LM7001 (PLL Synthesizer and Controller)



| Pin No. | Terminal | Description |
|---------|-------------------------------|---|
| 1 | XOUT | Connect to the 7.2 MHz crystal oscillator. |
| 2 | XIN | |
| 3 | CE | Chip enable terminal. Connect to the PLL terminal of microprocessor. |
| 4 | CL | Serial clock input terminal. Connect to the CLOCK terminal of microprocessor. |
| 5 | DATA | Serial data input terminal. Connect to the DATA terminal of microprocessor. |
| 6 | $\overline{\text{SYN}}$ | Not used. |
| 7 | $\overline{\text{AUTO/MONO}}$ | AUTO/MONO selection output terminal. "L" when AUTO. |
| 8 | $\overline{\text{FM}}$ | FM band control output terminal. "L" when FM. |
| 9 | $\overline{\text{AM}}$ | AM band control output terminal. "L" when AM. |
| 10 | AMIN | AM local oscillator input terminal. |
| 11 | FMIN | FM local oscillator terminal. |
| 12 | VDD 1 | Power supply terminal for back-up. |
| 13 | VDD 2 | Power supply terminal. |
| 14 | PD1 | Charge pump output of the phase detector which constitutes the PLL. High level is output when the divided local oscillator frequency is high than the reference frequency. In the opposite case, low level is output. Floating occurs when the frequencies matched. The output is applied to the variable capacitor diode in the local oscillator through the low pass filters. |
| 15 | PD2 | |
| 16 | Vss | Ground terminal. |

Q307, Q692

LC7822N (Analogue switch)



Q307

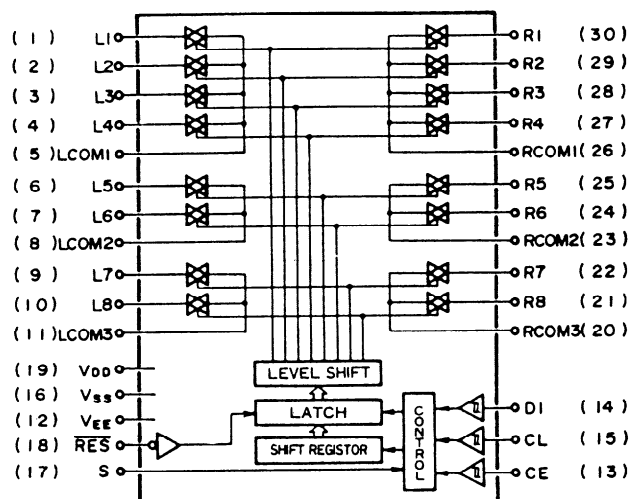
| Pin No. | Terminal | Description | Pin No. | Terminal | Description |
|---------|----------|--|---------|----------|--|
| 1 | PHONO' | Input/output terminals of audio signal of left channel. Control to the inside analogue switch at the serial data. | 16 | Vss | Ground terminal. |
| 2 | CD' | | 17 | S | Selector terminal |
| 3 | TAPE-1 | | 18 | RES | Reset terminal. When power is turned on, the condition of the analog switch is not determined, but when this terminal is "L", all analog switches are off. |
| 4 | L COM 1 | | 19 | VDD | Power supply terminal. (+15V) |
| 5 | TAPE-1 | | 20 | R COM 3 | Input/output terminals of audio signal of right channel. Control to the inside analogue switch at the serial data. |
| 6 | CD | | 21 | TAPE-2 | |
| 7 | PHONO | | 22 | SOURCE | |
| 8 | L COM 2 | | 23 | R COM 2 | |
| 9 | SOURCE | | 24 | PHONO | |
| 10 | TAPE-2 | | 25 | CD | |
| 11 | L COM 3 | | 26 | TAPE-1 | |
| 12 | Vss | Negative power supply terminal. (-15V) | 27 | R COM 1 | |
| 13 | CE | Chip enable terminal. Connect the terminal SEL of microprocessor. | 28 | TAPE-1' | |
| 14 | DI | Serial data input terminal. Connect the terminal DATA of microprocessor. | 29 | CD' | |
| 15 | CL | Serial clock input terminal. Connect the terminal CLOCK of microprocessor. | 30 | PHONO' | |

Q692

| Pin No. | Terminal | Description | Pin No. | Terminal | Description |
|---------|----------|---|---------|----------|--|
| 1 | DOLBY | Input/output terminals of audio signal of right channel when surround mode. Control the inside analogue switch at the serial data. | 16 | Vss | Ground terminal. |
| 2 | HALL | | 17 | S | Selector terminal |
| 3 | SIM | | 18 | RES | Reset terminal. When power is turned on, the condition of the analog switch is not determined, but when this terminal is "L", all analog switches are off. |
| 4 | L COM 1 | | 19 | VDD | Power supply terminal. (+15V) |
| 5 | TEST | Not used. | 20 | R COM 3 | Input/output terminals of audio signal of right channel when mode SIM. |
| 6 | TEST B | | 21 | SIM | |
| 7 | TEST A | | 22 | SIM | |
| 8 | L COM 2 | | 23 | R COM 2 | Dolby pro logic control signal. Control the inside analogue switch at the serial data. |
| 9 | SIM | Input/output terminals of audio signal of center channel when mode SIM. | 24 | TEST A | |
| 10 | SIM | | 25 | TEST B | |
| 11 | L COM 3 | | 26 | TEST | |
| 12 | Vss | Negative power supply terminal. (-15V) | 27 | R COM 1 | Input/output terminals of audio signal of left channel when surround mode. Control to the inside analogue switch at the serial data. |
| 13 | CE | Chip enable terminal. Connect the terminal SEL of microprocessor. | 28 | SIM | |
| 14 | DI | Serial data input terminal. Connect the terminal DATA of microprocessor. | 29 | HALL | |
| 15 | CL | Serial clock input terminal. Connect the terminal CLOCK of microprocessor. | 30 | DOLBY | |

Q308

LC7821N (Analogue switch)



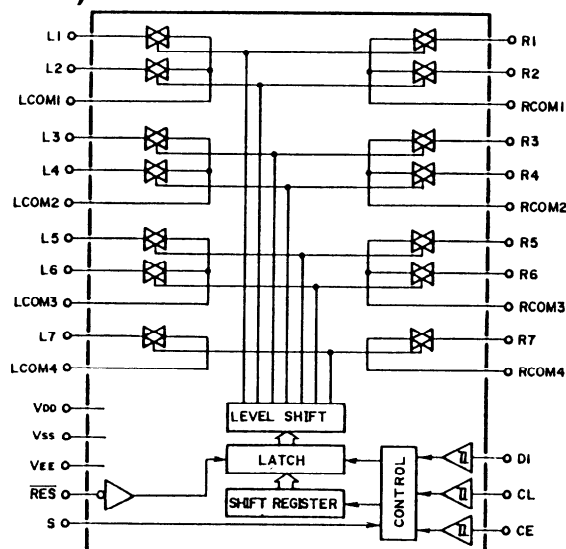
Q308

| Pin No. | Terminal | Description | Pin No. | Terminal | Description |
|---------|----------|---|---------|----------|--|
| 1 | TAPE-2' | Input/output terminals of audio signal of right channel. Control to the inside analogue switch at the serial data. | 16 | Vss | Ground terminal. |
| 2 | TUNER' | | 17 | S | Selector terminal |
| 3 | VIDEO-1' | | 18 | RES | Reset terminal. When power is turned on, the condition of the analog switch is not determined, but when this terminal is "L", all analog switches are off. |
| 4 | VIDEO-2' | | 19 | VDD | Power supply terminal. (+15V) |
| 5 | L COM 1 | | 20 | L COM 3 | Input/output terminals of audio signal of left channel. Control to the inside analogue switch at the serial data. |
| 6 | VIDEO-2 | | 21 | OFF | |
| 7 | VIDEO-1 | | 22 | TUNER | |
| 8 | L COM 2 | | 23 | L COM 2 | |
| 9 | TUNER | | 24 | VIDEO-1 | |
| 10 | OFF | | 25 | VIDEO-2 | |
| 11 | L COM 3 | | 26 | L COM 1 | |
| 12 | Vss | Negative power supply terminal. (-15V) | 27 | VIDEO-2' | |
| 13 | CE | Chip enable terminal. Connect the terminal SFL of microprocessor. | 28 | VIDEO-1' | |
| 14 | DI | Serial data input terminal. Connect the terminal DATA of microprocessor. | 29 | TUNER' | |
| 15 | CL | Serial clock input terminal. Connect the terminal CLOCK of microprocessor. | 30 | TAPE-2' | |

Serial Data Composition

| | A0 | A1 | A2 | A3 | SW1 | SW2 | SW3 | SW4 | SW5 | SW6 | SW7 | SW8 | |
|------|---------|----|----|----|--------------------|---------|----------|----------|---------|---------|------------|--------|--------|
| | Address | | | | Switch change over | | | | | | | | |
| Q306 | 0 | 1 | 0 | 1 | TAPE-2' | TUNER' | VIDEO-1' | VIDEO-2' | VIDEO-2 | VIDEO-1 | TUNER | | |
| Q307 | 0 | 0 | 1 | 1 | PHONO' | CD' | TAPE-1' | TAPE-1 | CD | PHONO | SOURCE | TAPE-2 | |
| Q309 | 0 | 1 | 1 | 1 | TAPE-1 | VIDEO-2 | SIM | SIM | DIRECT | | DIRECT | | |
| Q691 | 1 | 1 | 1 | 1 | DOLBY | DOLBY | DOLBY | HALL | NORMAL | WIDE | CENTER OFF | | TX-906 |
| Q692 | 1 | 0 | 1 | 1 | DOLBY | HALL | SIM | TEST | TESTA | TESTB | SIM | SIM | TX-906 |

Q309, Q691 **LC7823N (Analogue switch)**



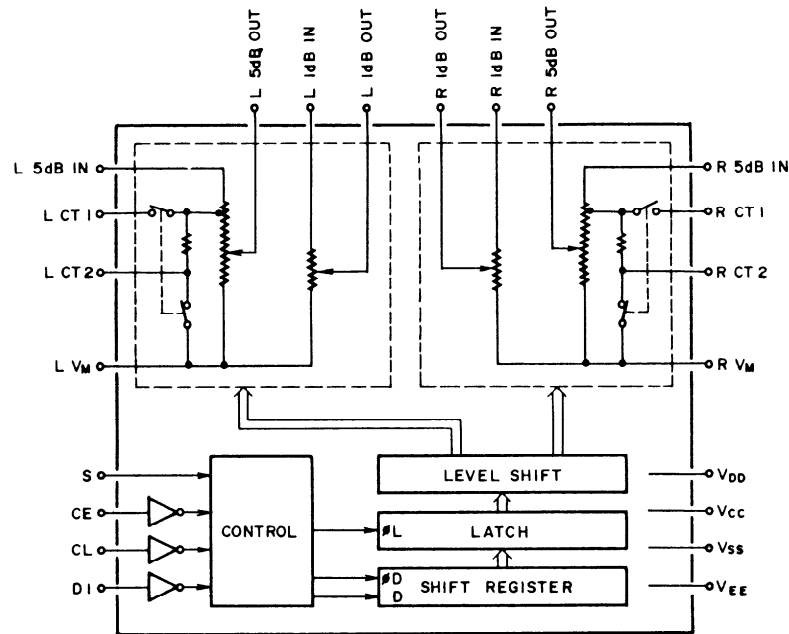
Q309

| Pin No. | Terminal | Description | Pin No. | Terminal | Description |
|---------|-------------|---|---------|-------------|--|
| 1 | TAPE-1 REC | Recording output terminals.Control the analogue switch at the serial data. | 16 | Vss | Ground terminal. |
| 2 | VIDEO-2 OUT | | 17 | S | Selector terminal |
| 3 | L COM 1 | | 18 | RES | Reset terminal.When power is turned on,the condition of the analog switch is not detrmind,but when this terminal iS "L",all analog switches are off. |
| 4 | SIM | Input/output terminals of audio signal of left channel when surround mode. Control the inside analogue switch at the serial data. | 19 | VDD | Power supply terminal.(+15V) |
| 5 | SIM | | 20 | R COM 4 | Input/output terminals of audio signal of right channel when surround mode. Control to the inside analogue switch at the serial data. |
| 6 | L COM 2 | | 21 | RIRECT | |
| 7 | DIRECT | | 22 | R COM 3 | |
| 8 | NC | | 23 | NC | |
| 9 | L COM 3 | | 24 | DIRECT | |
| 10 | DIRECT | Recording output terminals.Control the analogue switch at the serial data. | 25 | R COM 2 | Control to the inside analogue switch at the serial data. |
| 11 | L COM 4 | | 26 | SIM | |
| 12 | Vss | Negative power supply terminal. (-15V) | 27 | SIM | |
| 13 | CE | Chip enable terminal.Connect the terminal SEL of microprocessor. | 28 | R COM 1 | Recording output terminals.Control the analogue switch at the serial data. |
| 14 | DI | Serial data input terminal.Connect the terminal DATA of microprocessor. | 29 | VIDEO-2 OUT | |
| 15 | CL | Serial clock input terminal.Connect the terminal CLOCK of microprocessor. | 30 | TAPE-1 REC | |

Q691

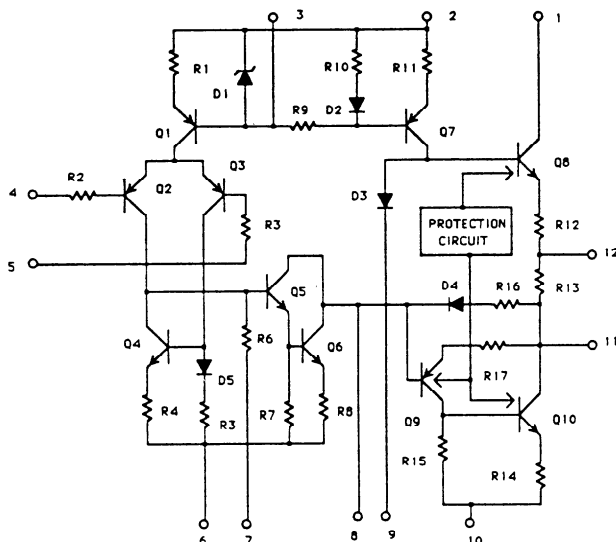
| Pin No. | Terminal | Description | Pin No. | Terminal | Description |
|---------|----------|---|---------|----------|--|
| 1 | DOLBY | Input/output terminals of audio signal of left channel when surround mode. Control the inside analogue switch at the serial data. | 16 | Vss | Ground terminal. |
| 2 | DOLBY | | 17 | S | Selector terminal |
| 3 | L COM 1 | | 18 | RES | Reset terminal.When power is turned on,the condition of the analog switch is not detrmind,but when this terminal iS "L",all analog switches are off. |
| 4 | DOLBY | | 19 | VDD | Power supply terminal.(+15V) |
| 5 | HALL | | 20 | R COM 4 | Input/output terminals of audio signal of right channel when surround mode. Control to the inside analogue switch at the serial data. |
| 6 | L COM 2 | | 21 | C. OFF | |
| 7 | NORMAL | | 22 | R COM 3 | |
| 8 | WIDE | | 23 | WIDE | |
| 9 | L COM 3 | | 24 | NORMAL | |
| 10 | C. OFF | | 25 | R COM 2 | |
| 11 | L COM 4 | | 26 | HALL | |
| 12 | Vss | Negative power supply terminal. (-15V) | 27 | DOLBY | |
| 13 | CE | Chip enable terminal.Connect the terminal SEL of microprocessor. | 28 | R COM 1 | |
| 14 | DI | Serial data input terminal.Connect the terminal DATA of microprocessor. | 29 | DOLBY | |
| 15 | CL | Serial clock input terminal.Connect the terminal CLOCK of microprocessor. | 30 | DOLBY | |

Q451
LC7536 (Electro Volume)

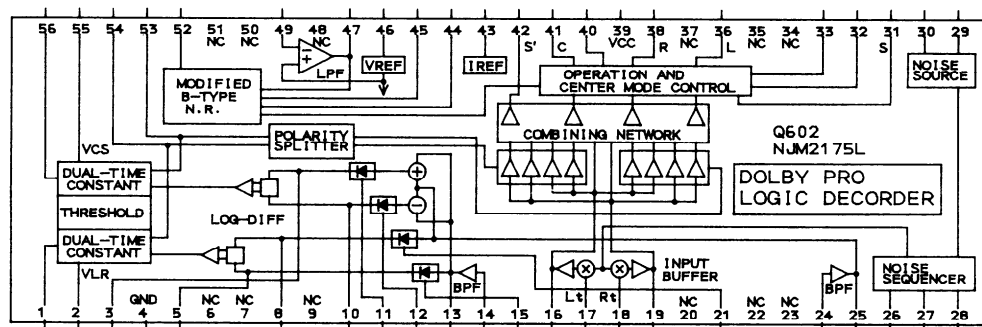


| No. | TERMINAL | DESCRIPTION | No. | TERMINAL | DESCRIPTION |
|-----|-----------|--|-----|-----------|-------------------------------------|
| 1 | L 5dB IN | 5dB step attenuator input terminal | 17 | CL | Serial data input terminal |
| 3 | L CT1 | Terminal for loudness | 18 | DI | Serial data input terminal |
| 4 | L CT2 | Terminal for loudness | 19 | CE | Serial data input terminal |
| 5 | L 5dB OUT | 5dB step attenuator output terminal | 21 | VCC | Power supply terminal |
| 6 | L 1dB IN | 1dB step attenuator input terminal | 22 | R VM | Common terminal of volume |
| 8 | L 1dB OUT | 1dB step attenuator output terminal | 23 | R 1dB OUT | 1dB step attenuator output terminal |
| 9 | L VM | Common terminal of volume | 25 | R 1dB IN | 1dB step attenuator input terminal |
| 10 | VEE | Power supply terminal | 26 | R 5dB OUT | 5dB step attenuator output terminal |
| 12 | S | Select terminal of address code during data format | 27 | R CT2 | Terminal for loudness |
| 13 | VDD | Power supply terminal | 28 | R CT1 | Terminal for loudness |
| 14 | VSS | Power supply terminal | 30 | R 5dB IN | 5dB step attenuator input terminal |

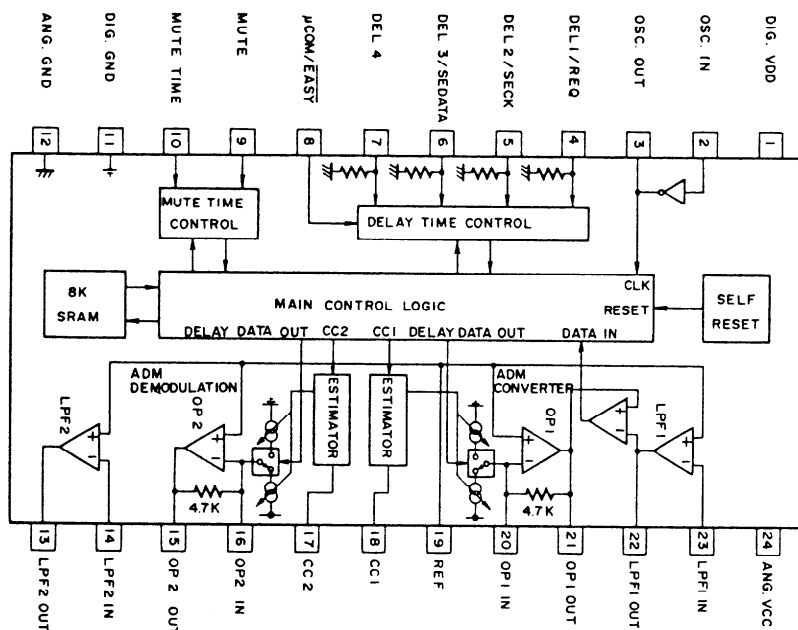
Q501, Q502
μPC1298V (Power Amplifier Driver)



Q602 NJM2175L (Dolby Pro Logic Decoder)

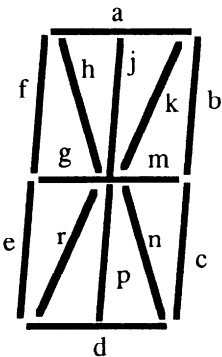
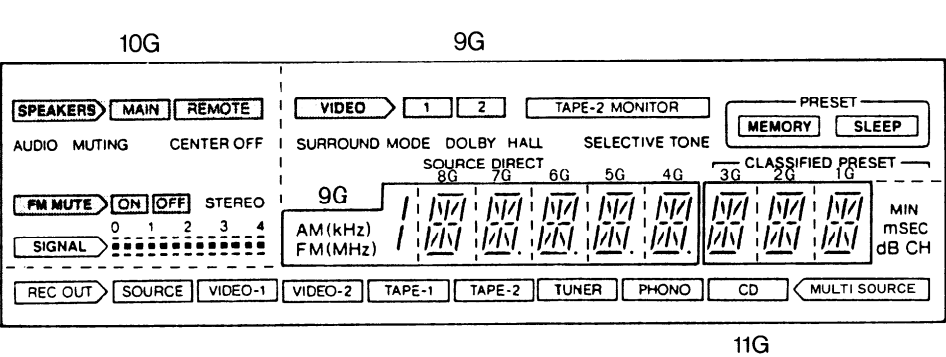


Q661 M50198P (Digital Delay)



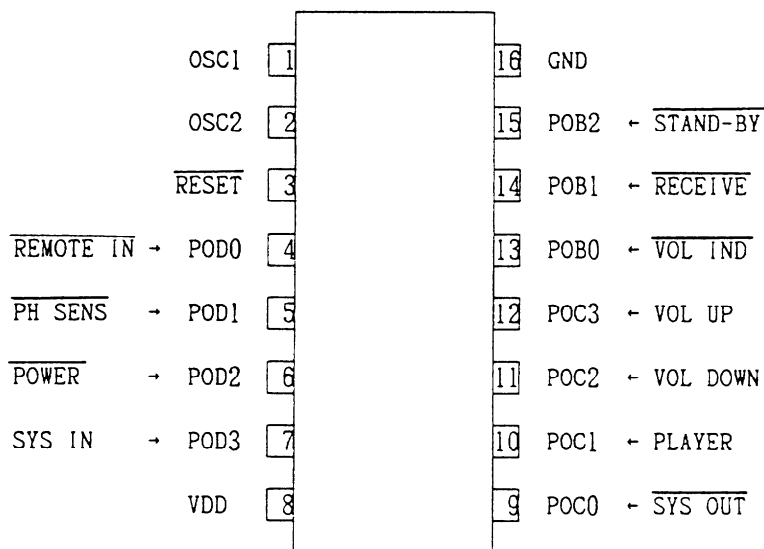
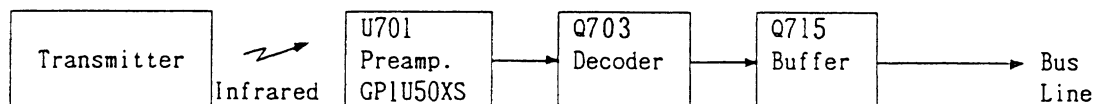
| Pin no. | Symbol | Function |
|---------|-------------|--|
| 1 | DIG GND | Power supply terminal of digital section |
| 2 | OSC. IN | Connect the 3.27MHz ceramic oscillator or external clock. |
| 3 | OSC. OUT | |
| 4 | DEL1/REQ | Terminal DEL1 when the easy mode. Terminal REQ when the microprocessor. |
| 5 | DEL2/SECK | Terminal DEL2 when the easy mode. Terminal SECK when the microprocessor. |
| 6 | DEL3/SEDATA | Terminal DEL3 when the easy mode. Terminal SEDATA when the microprocessor. |
| 7 | DEL4 | 80usec. mode control terminal. |
| 8 | COM/EASY | Microprocessor or easy mode changeover terminal |
| 9 | MUTE | Manual muting control terminal. |
| 10 | MUTE TIME | Auto muting time changeover terminal. |
| 11 | DIG.GND | Digital ground |
| 12 | ANG.GND | Analog ground |
| 13 | LPF2 OUT | Connect the secondary low pass filter between pins 13 & 14. |
| 14 | LPF2 IN | |
| 15 | OP2 OUT | Operation amplifier output terminal |
| 16 | OP2 IN | Operation amplifier input terminal |
| 17 | CC2 | Current control |
| 18 | CC1 | Current control |
| 19 | REF | Reference voltage.(2.5V) |
| 20 | OP1 IN | Operation amplifier input terminal |
| 21 | OP1 OUT | Operation amplifier outout terminal |
| 22 | LPF1 OUT | Connect the low pass filter between pins 22 and 23. |
| 23 | LPF1 IN | |
| 24 | ANG.VCC | Power supply terminal of analog section. |

Q701
11-BT-107GK (Fluorescent Indicator Tube)



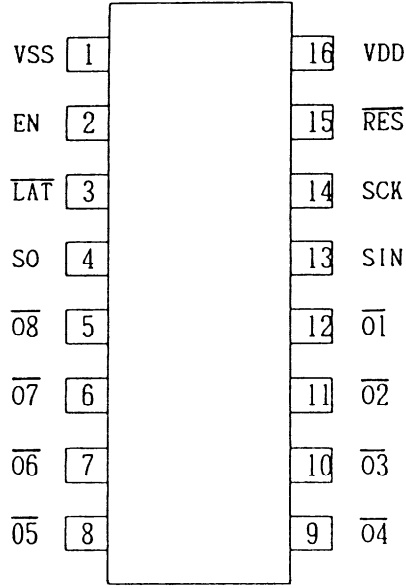
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------|----|----|----|----|----|----|----|----|----|----|-----|-----|----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|
| PIN NO. | 51 | 50 | 49 | 48 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 29 | 28 | 27 | 26 |
| CONNECTION | F2 | F2 | NP | NP | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 | P10 | P11 | P12 | P13 | P14 | P15 | NC | NP | NP | NP | NP | NP | NP |
| PIN NO. | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
| CONNECTION | NP | NP | NP | NP | NP | NC | NC | NC | NC | NC | 11G | 10G | 9G | 8G | 7G | 6G | 5G | 4G | 3G | 2G | 1G | NP | NP | F1 | F1 | |

| | | | | | | | | | | | |
|-----|-----------------|--------------|----------------|----|----|----|----|----|----|----|----|
| | 11G | 10G | 9G | 8G | 7G | 6G | 5G | 4G | 3G | 2G | 1G |
| P1 | dB | AUDIO MUTING | TAPE-2 MONITOR | d | d | d | d | d | d | d | d |
| P2 | CH | REMOTE | 2 | c | c | c | c | c | c | c | c |
| P3 | mSEC | MAIN | 1 | b | b | b | b | b | b | b | b |
| P4 | MIN | SPEAKERS | VIDEO | a | a | a | a | a | a | a | a |
| P5 | MULTI SOURCE | CENTER OFF | SURROUND MODE | e | e | e | e | e | e | e | e |
| P6 | Frame of CD | FM MUTE | DOLBY | f | f | f | f | f | f | f | f |
| P7 | Frame of PHONO | ON | HALL | g | g | g | g | g | g | g | g |
| P8 | Frame of TUNER | OFF | SELECTIVE TONE | h | h | h | h | h | h | h | h |
| P9 | Frame of TAPE2 | STEREO | SOURCE DIRECT | j | j | j | j | j | j | j | j |
| P10 | Frame of TAPE1 | S2 | MEMORY | k | k | k | k | k | k | k | k |
| P11 | Frame of VIDEO2 | B1 | SLEEP | m | m | m | m | m | m | m | m |
| P12 | Frame of VIDEO1 | B2 | S1 | n | n | n | n | n | n | n | n |
| P13 | Frame of SOURCE | B3 | AM(kHz) | p | p | p | p | p | p | p | p |
| P14 | REC OUT | B4 | FM(MHz) | r | r | r | r | r | r | r | r |
| P15 | S3 | | | - | o | o | o | o | - | - | - |

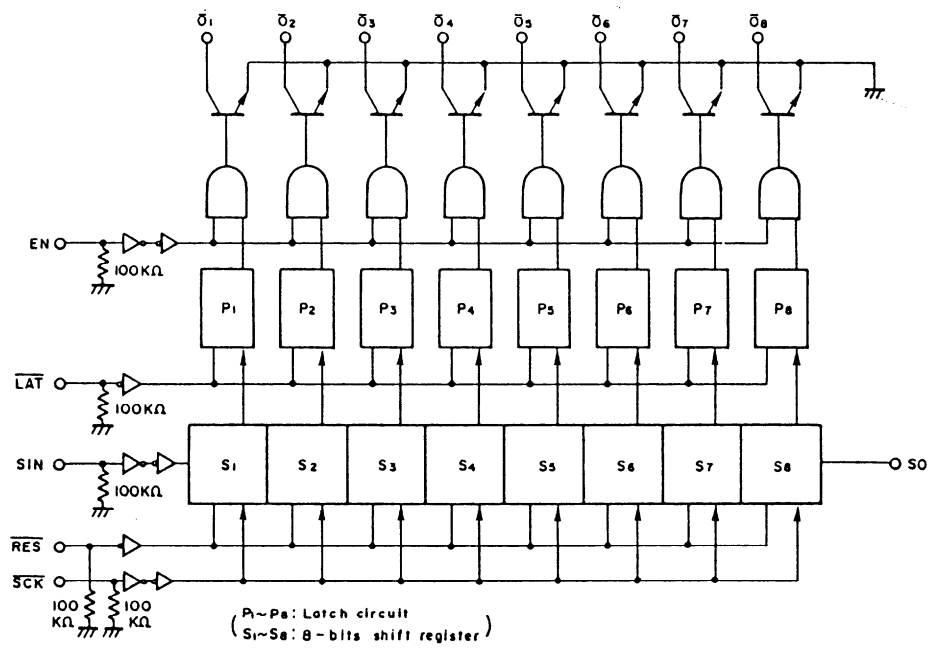
Q703**μPD17103CX-531 (Remote Control Decoder)**

| Pin No. | Symbol | Terminal | Description |
|---------|-----------------|--------------|---|
| 1 | OSC1 | OSC | Connect to the 8.00MHz ceramic oscillator. |
| 2 | OSC2 | | |
| 3 | RES | RESET | System reset terminal. Active low. |
| 4 | POD0 | REMOTE IN | Signal input terminal from preamp. for remote control. Active low. |
| 5 | POD1 | PHONO SENSES | Phono detection input terminal. Active low. |
| 6 | POD2 | POWER | Stand-by detection input terminal. During low input, only the POWER code is decoded. |
| 7 | POD3 | SYS IN | System code input terminal. |
| 8 | V _{DD} | +B | Power supply terminal. |
| 9 | POC0 | SYS OUT | Output at this terminal are the custom code (16bits) remote control code input to REMOTE IN, data code (8bits), and the serial code (12bits) that has been converted corresponding to the decoded data code (8bits) |
| 10 | POC1 | PLAYER | When the player PLAY/REEJECT is input, a high pulse of 200ms is output. |
| 11 | POC2 | VOL DOWN | When the volume DOWN code is input, a high pulse of 120ms is output. |
| 12 | POC3 | VOL UP | When the volume UP code is input, a high pulse of 120ms is output. |
| 13 | POB0 | VOL IND | During the output of VOLUME UP/DOWN, a pulse ($\overline{\text{T}}\text{T}\text{T}\text{T}$ = 250ms) is output. (Not used.) |
| 14 | POB1 | RECEIVE | This is the display output for remote control reception. Output is low when decoded code is being recieved. |
| 15 | POB2 | STAND-BY | STAND-BY indication terminal. |
| 16 | V _{SS} | GND | Ground terminal. |

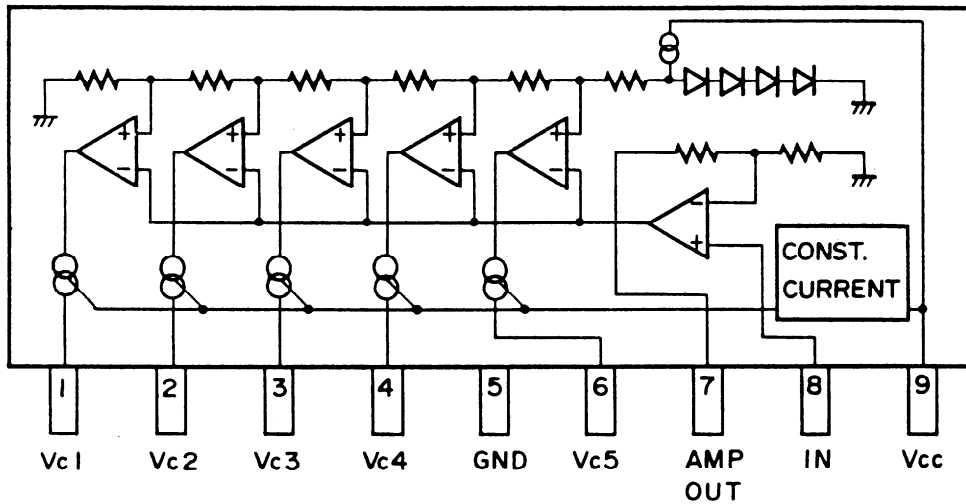
Q705, Q851
μPD6345C (Extended IC)



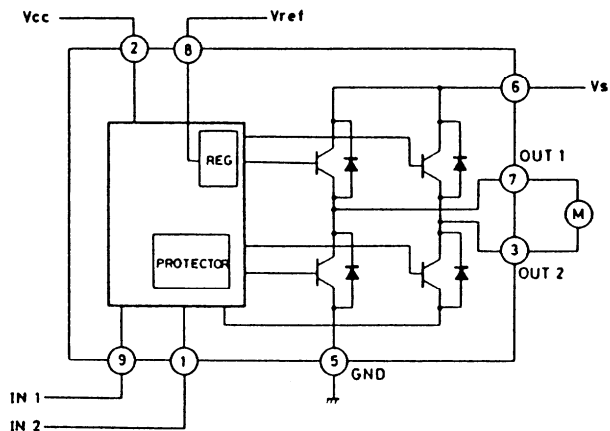
| | | Q705 | Q851 |
|---------|--------|---|---|
| Pin No. | Symbol | Description | Description |
| 1 | Vss | Ground terminal. | |
| 2 | EN | Chip enable input terminal. Connect to the terminal EN of the microprocessor. Active H. | |
| 3 | LAT | Latch input terminal. Connect to the terminal LAT of the microprocessor. | |
| 4 | SO | Serial data output terminal. | |
| 5 | O8 | NR OFF indicator output terminal. Active low. | Headphone relay control output terminal. Active low. |
| 6 | O7 | NR ON indicator output terminal. Active low. | Rear speaker relay control output terminal. Active low. |
| 7 | O6 | HB OFF indicator output terminal. Active low. | Remote speaker relay control output terminal. Active low. |
| 8 | O5 | HB ON indicator output terminal. Active low. | Main speaker relay control output terminal. Active low. |
| 9 | O4 | LOCAL indicator output terminal. Active low. | Center preout muting control output terminal. Active low. |
| 10 | O3 | DX indicator output terminal. Active low. | Not used. |
| 11 | O2 | AUTO indicator output terminal. Active low. | Video selector switch control output terminal. |
| 12 | O1 | MONO indicator output terminal. Active low. | Video selector switch control output terminal. |
| 13 | SIN | Serial data input terminal. Connect to the terminal DATA of the microprocessor. | |
| 14 | SCK | Serial clock input terminal. Connect to the terminal CLOCK of the microprocessor. | |
| 15 | RESET | Reset input terminal. Active L. | |
| 16 | VDD | Power supply terminal. | |



Q706
BA6125 (Signal meter driver)



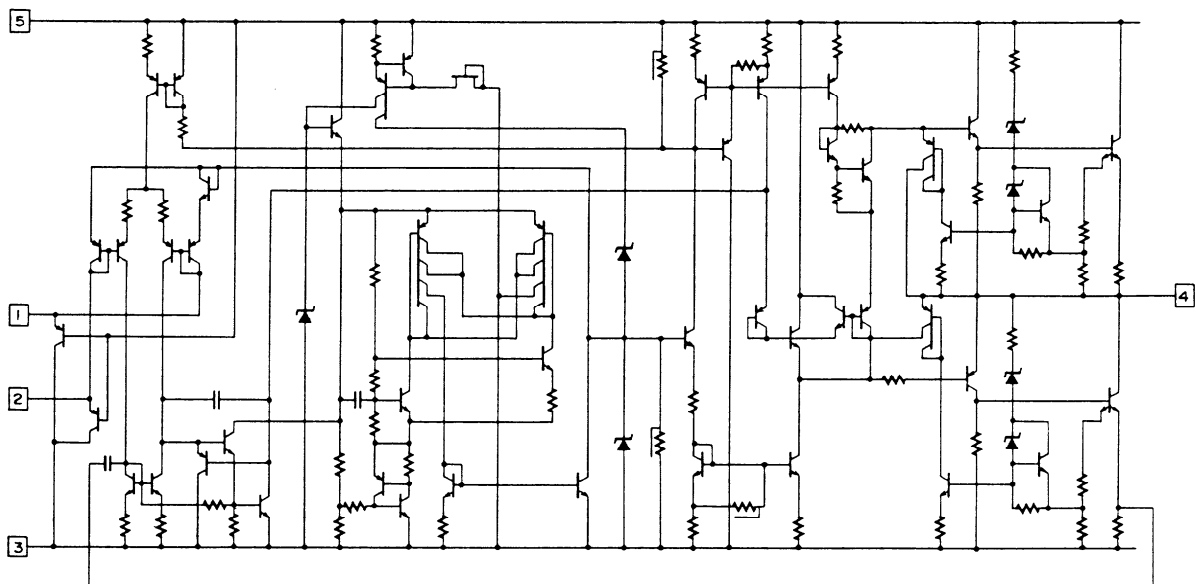
Q871
TA7291S (Volume driver)



| INPUT | | OUTPUT | | MODE |
|-------|------|----------|----------|--------|
| IN 1 | IN 2 | OUT 1 | OUT 2 | |
| 0 | 0 | ∞ | ∞ | STOP |
| 1 | 0 | H | L | CW/CCW |
| 0 | 1 | L | H | CCW/CW |
| 1 | 1 | L | L | BRAKE |

CCW: Counter clockwise direction
 CW: Clockwise direction

Q571, Q572
SI-18751 (Power amplifier)



ADJUSTMENT PROCEDURES

• Preparation

1. Input

FM mono: 1kHz, 75kHz devi., 60dB/ μ V

FM stereo: 1kHz, 75kHz devi., 60dB/ μ V

Pilot signal 19kHz 7.5kHz devi.

AM: 400Hz 30% mod.

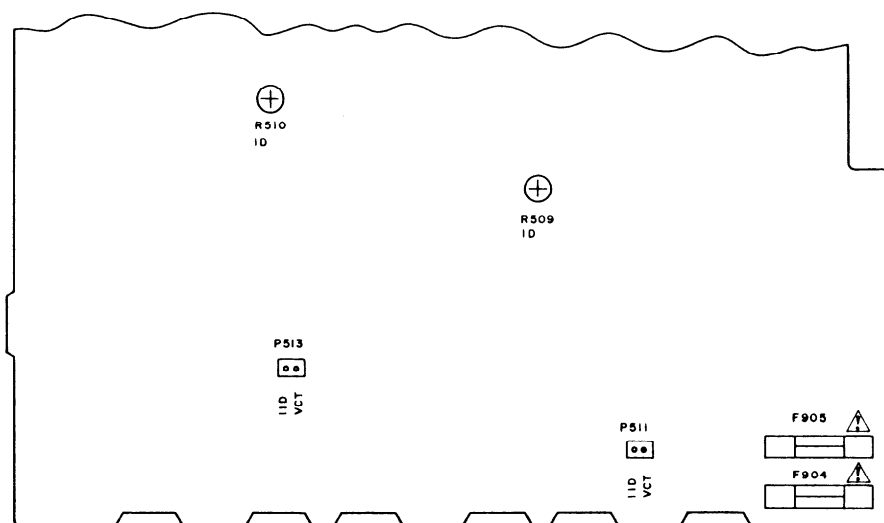
2. Outputs

Connect the non-inductive type resistors of 8ohms to the main speaker, remote speaker, and rear speaker terminals unless otherwise noted.

3. Standard Knob Position

TAPE MONITOR 2OFF
 VOLUME.....Maximum
 BASS/TREBLE/BALANCE/INPUT
 BALANCE.....Center
 MUTING.....OFF
 REC SELECTOR.....SOURCE
 INPUT SELECTOR.....CD
 SPEAKERSON
 S.T.C.OFF

SURROUND MODE.....OFF
 CENTER MODE.....WIDE
 DELAY TIME.....20mS
 MULTI/REAR LEVELCenter



SELECTOR AND POWER AMPLIFIER PC BOARD

Amplifier section

Idling Current Adjustment

Connect the DC voltmeter to the terminals IID and VCT on the pre., and main amplifier pc board. Adjust the semi-fixed resistors R509, and R510 so that indication of voltmeter is 5 ± 0.5 mV.

NOTE: Adjust after switching on for 5 minutes.

FM section

| Item | Step | Connection of instrument | FM SG output | Stereo modulator output | Tuning frequency | Output indicator | Adjustment point | Adjust for | Remarks |
|-------------------|------|--------------------------|--|-------------------------|------------------|------------------------|----------------------|--------------------------------|--|
| FM IF/RF | 1 | Fig. 1 | 99.1MHz 1kHz, 75kHz devi. 65dBf (60dB) | | 99.1MHz | DC voltmeter | L101 | $0 \pm 20\text{mV}$ | FM MUTE/MODE switch: ON/STEREO Repeat the steps 1 and 3 until no further adjustment is necessary. |
| | 2 | | | | | AC voltmeter | IFT on the front end | Maximum | |
| | 3 | | | | | Distortion analyzer | L102 | Minimum | |
| VCO | | Fig. 2 | 99.1MHz 1kHz, 75kHz devi. 65dBf (60dB) | | 99.1MHz | Frequency counter | R201 | $19\text{kHz} \pm 10\text{Hz}$ | |
| Stereo Distortion | | Fig. 3 | 99.1MHz, Ext mod., 65dBf (60dB) | Channel L or R 1kHz | 99.1MHz | Distortion analyzer | IFT on the front end | Minimum | Don't turn more than $\pm 180^\circ$ |
| Stereo Separation | 1 | Fig. 3 | 99.1MHz Ext modulation 65dBf (60dB) | Channel L 1kHz | 99.1MHz | Channel R AC voltmeter | R202 | Minimum | Maximum and same separation. |
| | 2 | | | Channel R 1kHz | | Channel L AC voltmeter | | Minimum | |
| Muting Level | | Fig. 3 | 99.1MHz 17.2dBf (12dB) | | 99.1MHz | AUTO indicator | R101 | Light on | |
| Signal Level | | Fig. 3 | 99.1MHz 35dBf (30dB) | | 99.1MHz | 4th Signal indicator | R102 | Light on | |

AM section

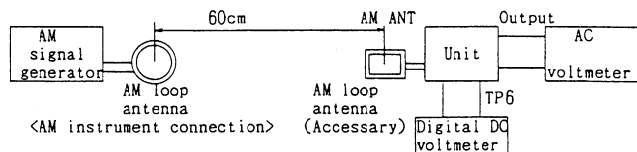
| Step | AM SG output | Tuning frequency | Output indicator | Adjustment point | Adjust for |
|------|-------------------------------------|------------------|----------------------|---------------------------|-----------------------|
| 1 | | 530kHz | Digital DC voltmeter | OSC coil on RF block L151 | $1.2 \pm 0.1\text{V}$ |
| 2 | 600kHz 400Hz, 30% mod. 60dB/m | 600kHz | AC voltmeter | RF coil on RF block L151 | Maximum |
| 3 | 990kHz 400Hz, 30% mod. 60dB/m | 990kHz | AC voltmeter | L152 | Maximum |

Reference Specifications

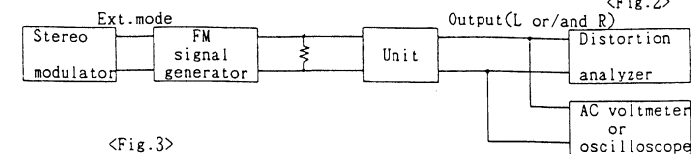
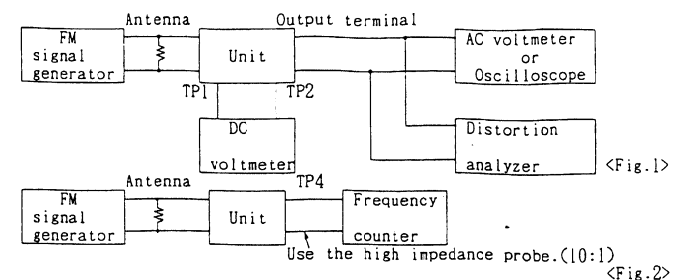
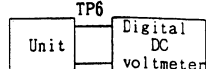
FM tuned voltage: $87.5\text{MHz} - 108.00\text{MHz}$
 $1.6 \pm 0.4\text{V} - 8.0 \pm 0.4\text{V}$

AM tuned voltage: 530kHz $1.2 \pm 0.5\text{V}$
 1710kHz $7.0 \pm 0.5\text{V}$

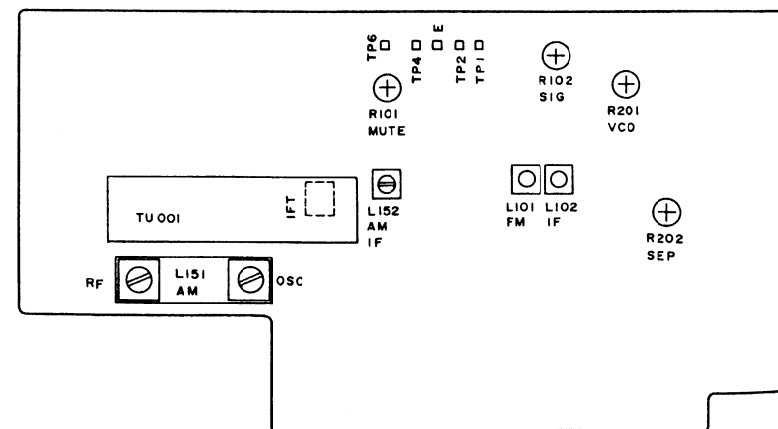
Auto stop level: AM: Less than $65\text{dB}/\mu$
 FM: Less than $16\text{dB}/\mu$



Confirmation of tuned voltage



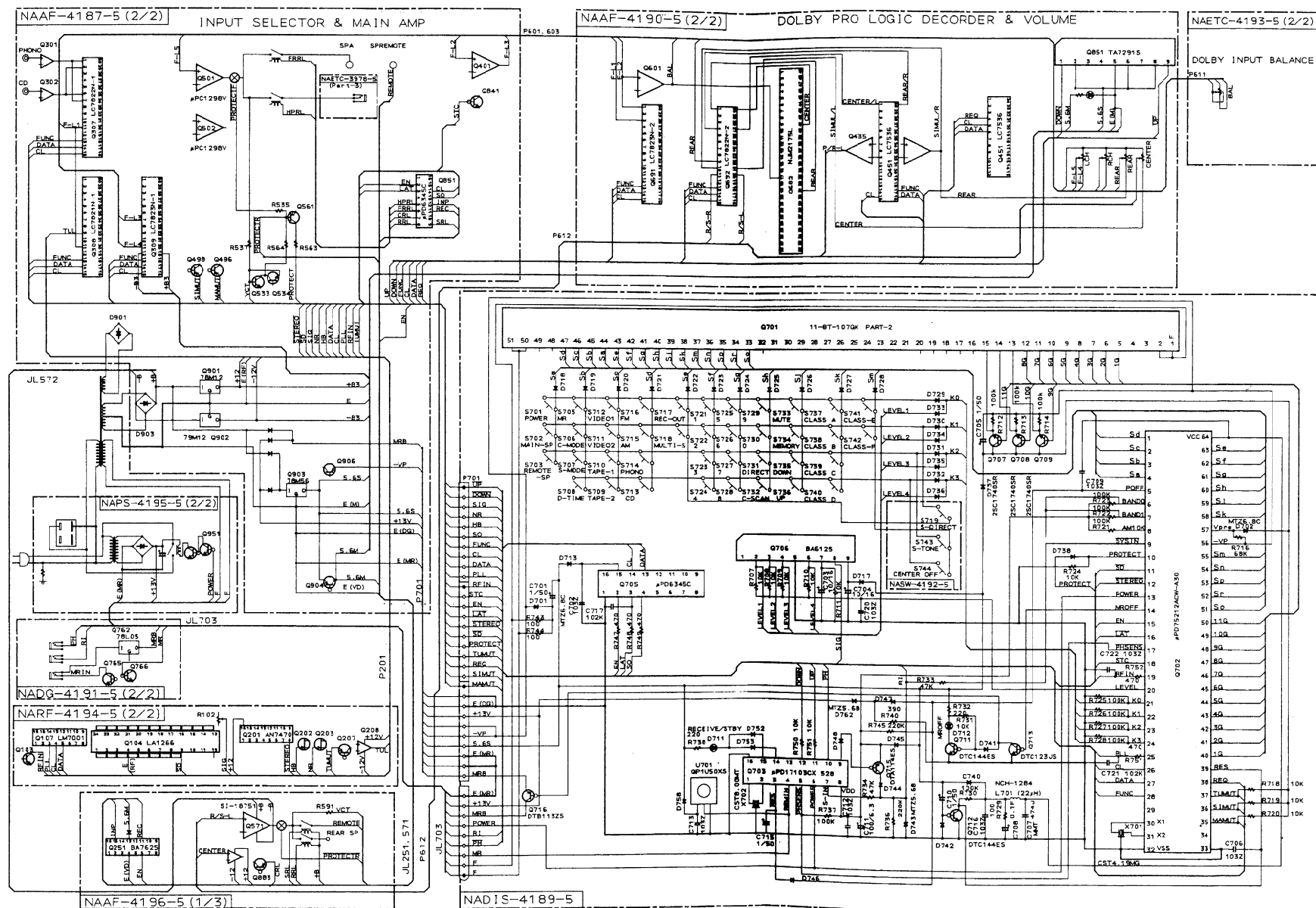
<Fig.3>



Tuner circuit pc board

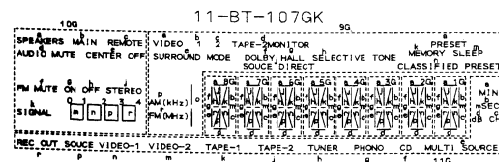
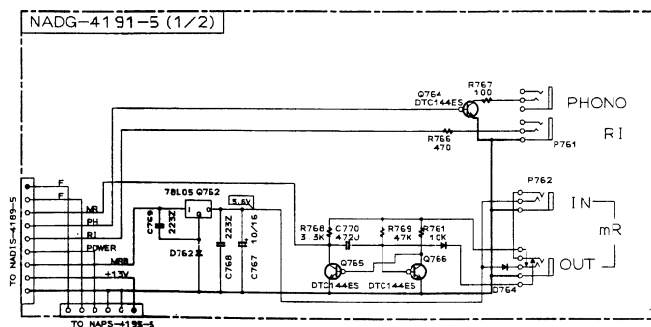
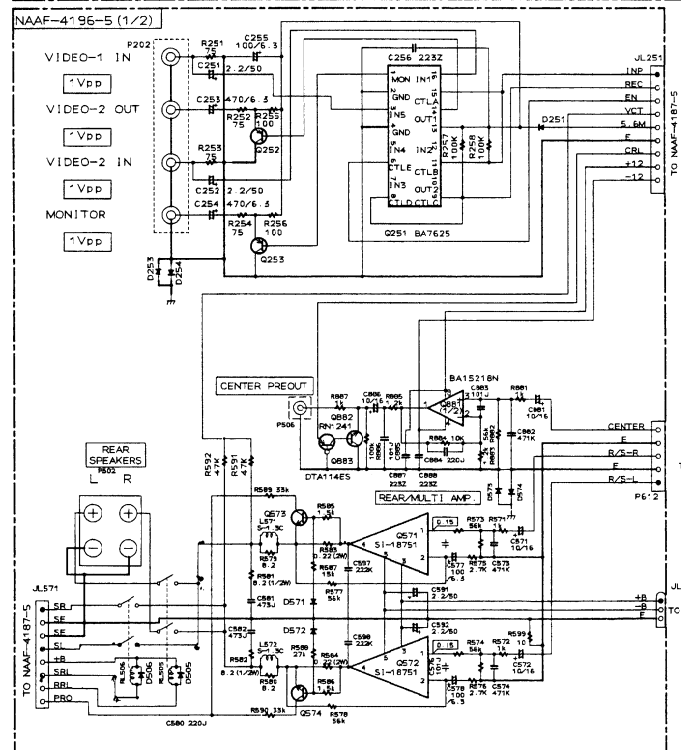
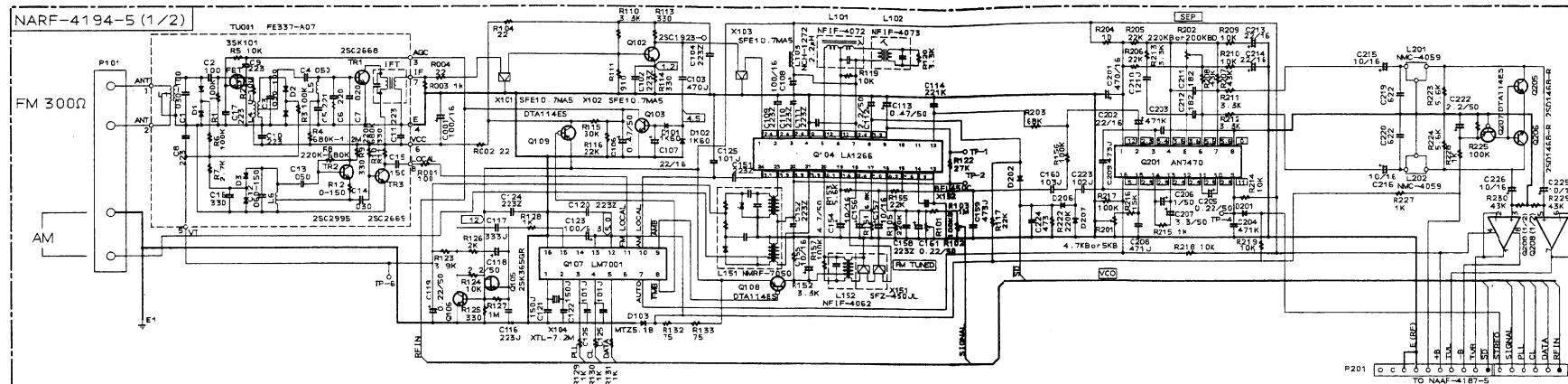
SCHEMATIC DIAGRAM

CONNECTION DIAGRAM OF MICROPROCESSOR



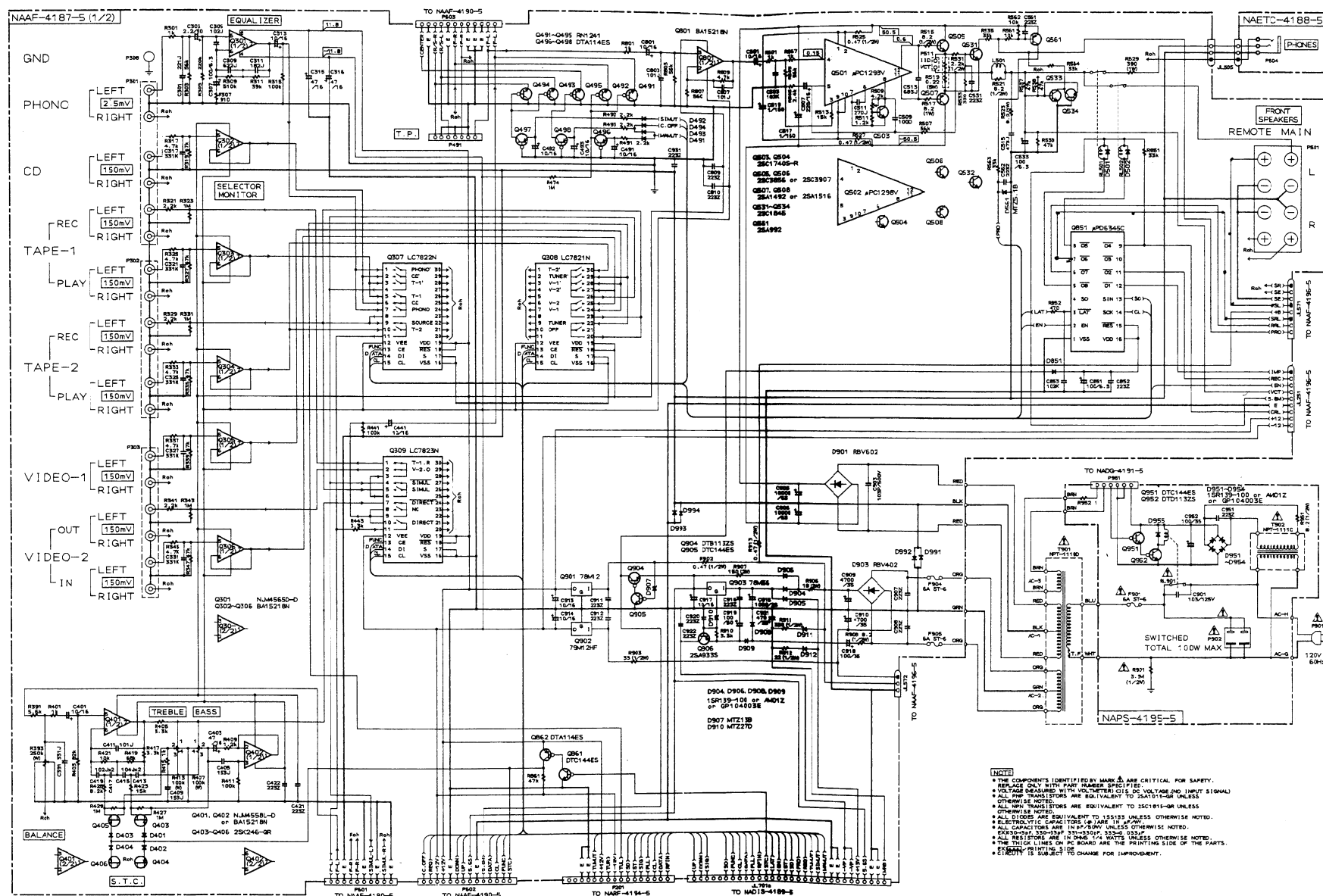
SCHEMATIC DIAGRAM

TUNER AND VIDEO SECTION

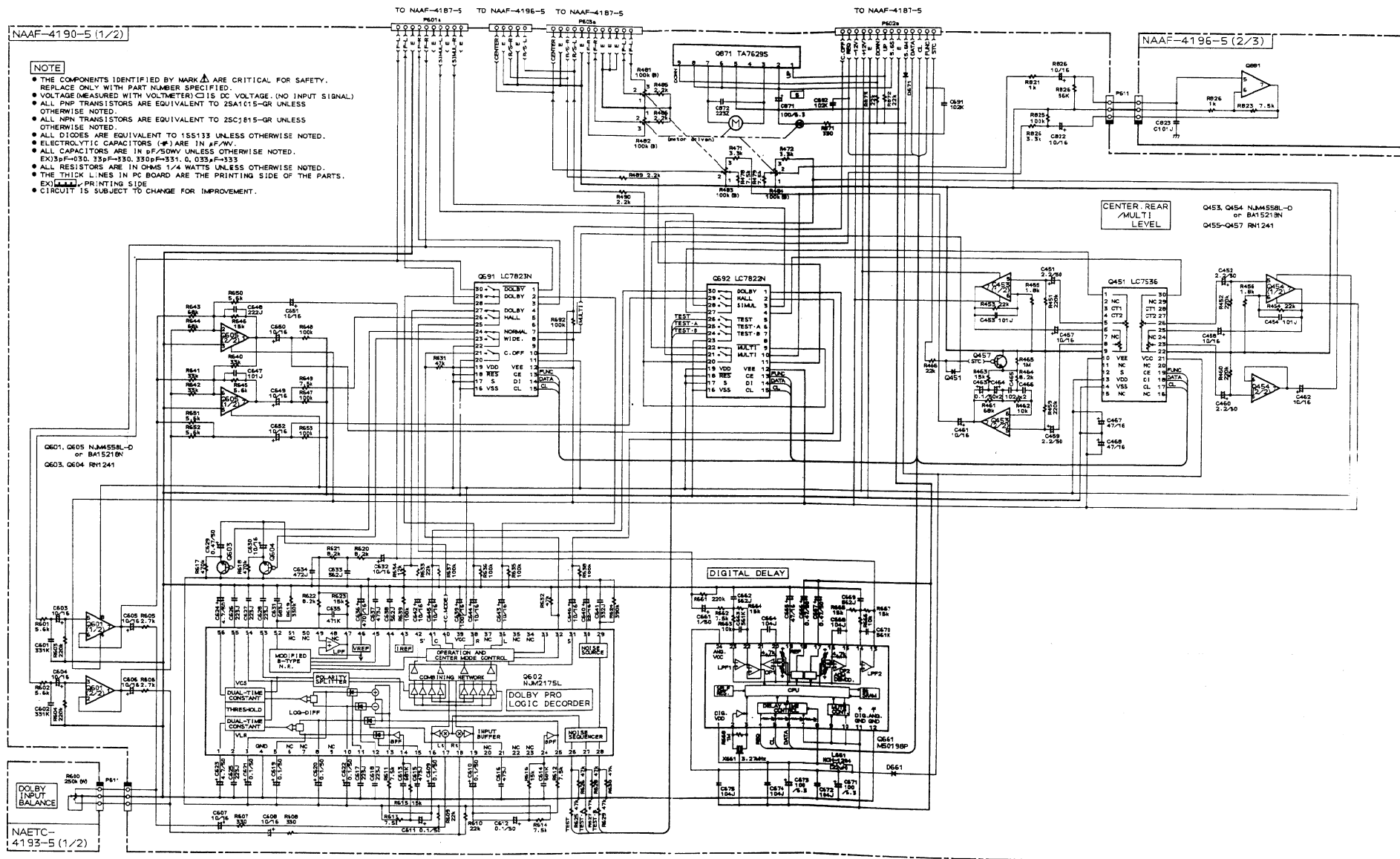


SCHEMATIC DIAGRAM

AUDIO SECTION



SCHEMATIC DIAGRAM
SURROUND SECTION




PRINTED CIRCUIT BOARD PARTS LIST



CAUTION:

Replacement for transistor of mark ☆, if necessary must be made from the same beta group (HFE) as the original type.

SELECTOR AND POWER AMPLIFIER PC BOARD (NAAF-4187-5)

| CIRCUIT NO. | PART NO. | DESCRIPTION | CIRCUIT NO. | PART NO. | DESCRIPTION |
|-------------|--------------|----------------|-------------|------------|--|
| | ICs | | | Diodes | |
| Q301 | 22240191 | NJM4565D-D | D911,D912 | 223163 or | 1SS133 or |
| Q302-Q306 | 22240247 | BA15218N | D991-D994 | 223205 | 1SS270A |
| Q307 | 22240270 | LC7822N | | Coils | |
| Q308 | 22240280 | LC7821N | L501,L502 | 231176 | S-1.3C |
| Q309 | 22240339 | LC7823N | | Capacitors | |
| Q401,Q402 | 22240247 or | BA15218N or | C303,C304 | 354780229 | 2.2 μ F,50V,Elect. |
| | 22240293 | NJM4558L-D | C307,C308 | 354721019 | 100 μ F,6.3V,Elect. |
| Q501,Q502 | 22240311 | μ PC1298V | C309,C310 | 374726224 | 6200pF \pm 5%,50V,Plastic |
| Q801 | 22240247 | BA15218N | C311,C312 | 374721824 | 1800pF \pm 5%,50V,Plastic |
| Q851 | 22240211 | μ PD6345C | C313,C314 | 354761009 | 10 μ F,35V,Elect. |
| Q901 | 222780122NEC | 78M12 | C315,C316 | 354744709 | 47 μ F,16V,Elect. |
| Q902 | 222790125 | 79M12 | C401,C402 | 354761009 | 10 μ F,35V,Elect. |
| Q903 | 222780565JRC | 78M56 | C403,C404 | 354744709 | 47 μ F,16V,Elect. |
| | Transistors | | C405,C406 | 374721534 | 0.015 μ F \pm 5%,50V,Plastic |
| Q403-Q406 | 2211945 | 2SK246-GR | C409,C410 | 374721534 | 0.015 μ F \pm 5%,50V,Plastic |
| Q491-Q495 | 2213631 or | RN1241-A or | C413-C416 | 374721044 | 0.1 μ F \pm 5%,50V,Plastic |
| | 2213632 | RN1241-B | C417-C420 | 374721024 | 1000pF \pm 5%,50V,Plastic |
| Q496-Q498 | 2213510 | DTA114ES | C441,C442 | 354761009 | 10 μ F,35V,Elect. |
| Q503,Q504 | 2213284 | 2SC1740S-R | C491-C493 | 354761009 | 10 μ F,35V,Elect. |
| Q505,Q506 | 2201653, | ☆ 2SC3856-O, | C501,C502 | 354761009 | 10 μ F,35V,Elect. |
| | 2201654, | ☆ 2SC3856-Y, | C507,C508 | 354742219 | 220 μ F,16V,Elect. |
| | 2201655, | ☆ 2SC3856-P, | C513,C514 | 374726834 | 0.068 μ F \pm 5%,50V,Plastic |
| | 2202272 or | ☆ 2SC3907-R or | C515,C516 | 374724734 | 0.047 μ F \pm 5%,50V,Plastic |
| | 2202273 | ☆ 2SC3907-O | C517-C520 | 354700109 | 1 μ F,160V,Elect. |
| Q507,Q508 | 2201663, | ☆ 2SA1492-O, | C533,C851 | 354721019 | 100 μ F,6.3V,Elect. |
| | 2201664, | ☆ 2SA1492-Y, | C801,C802 | 354761009 | 10 μ F,35V,Elect. |
| | 2201665, | ☆ 2SA1492-O, | C905,C906 | 3504245 | 8200 μ F,50V,Elect. |
| | 2202262 or | ☆ 2SA1516-R or | C909,C910 | 3504213 | 4700 μ F,35V,Elect. |
| | 2202263 | ☆ 2SA1516-O | C913,C914 | 354761009 | 10 μ F,35V,Elect. |
| Q531-Q534 | 2211732 or | 2SC1845-F or | C915 | 354751029 | 1000 μ F,25V,Elect. |
| | 2211733 | 2SC1845-E | C917 | 354761009 | 10 μ F,35V,Elect. |
| Q561 | 2211792 or | 2SA992-F or | C918 | 354761019 | 100 μ F,35V,Elect. |
| | 2211793 | 2SA992-E | C919 | 354781019 | 100 μ F,50V,Elect. |
| Q861,Q905 | 221282 | DTC144ES | C921 | 354754719 | 470 μ F,25V,Elect. |
| Q862 | 2213510 | DTA114ES | | Resistors | |
| Q904 | 2213830 | DTB113ZS | R393 | 5104225 | N11RGLC250KWT22Z, Variable, Balance |
| Q906 | 2213354 | 2SA933S-R | R407,R408 | 5104230 | N14RLC100KWT22Z, Variable, Bass |
| | Diodes | | R413,R414 | 5104230 | N14RLC100KWT22Z, Variable, Treble |
| D401-D404 | 223163 or | 1SS133 or | R509,R510 | 5210261 | N06HR 5KBC, Semi-fixed |
| D491-D494 | 223205 | 1SS270A | R515,R516 | 442520824 | 8.2 Ω \pm 5%, 1/2W, Metal oxide film |
| D501,D502 | 223163 or | 1SS133 or | R517,R518 | 441620824 | 8.2 Ω \pm 5%, 1W, Metal oxide film |
| D851,D905 | 223205 | 1SS270A | R519,R520 | 4500031 | 0.22 Ω , 5W, Metal plate |
| D561 | 224450512 | MTZ5.1B | R521,R522 | 442520824 | 8.2 Ω \pm 5%, 1/2W, Metal oxide film |
| D901 | 22380038 | RBV602 | R523,R524 | 441620824 | 8.2 Ω \pm 5%, 1W, Metal oxide film |
| D903 | 22380048 | RBA402 | R525-R528 | 442524794 | 0.47 Ω \pm 5%, 1/2W, Metal oxide film |
| D904,D906 | 22380032, | 1SR139-100, | R529,R530 | 441623914 | 390 Ω \pm 5%, 1W, Metal oxide film |
| D908,D909 | 22380035 or | GP104003E or | R531,R532 | 442522224 | 2.2k Ω \pm 5%, 1/2W, Metal oxide film |
| | 22380046 | AM01Z | R902 | 441524794 | 0.47 Ω \pm 5%, 1/2W, Metal oxide film |
| D907 | 224451302 | MTZ13B | R903 | 442523304 | 33 Ω \pm 5%, 1/2W, Metal oxide film |
| D910 | 224452704 | MTD27D | R906 | 441721804 | 18 Ω \pm 5%, 2W, Metal oxide film |
| | | | R907 | 441721514 | 150 Ω \pm 5%, 2W, Metal oxide film |

NOTE: THE COMPONENTS IDENTIFIED BY MARK  ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PART NUMBER SPECIFIED.

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|-------------|-----------|--|
| Resistors | | |
| R908 | 442524704 | 47 Ω \pm 5%, 1/2W, Metal oxide film |
| R911 | 442523314 | 330 Ω \pm 5%, 1/2W, Metal oxide film |
| R912 | 442522204 | 22 Ω \pm 5%, 1/2W, Metal oxide film |
| R913 | 442524794 | 0.47 Ω \pm 5%, 1/2W, Metal oxide film |
| Relaies | | |
| RL501 | 25065396 | NRL-2P1.25A-DC24-067 |
| RL502 | 25065339 | NRL-2P5A-DC24-046 |
| Terminals | | |
| P301-P303 | 25045300 | NPJ-6PDBL159 |
| P501 | 25060159 | NTM-8PDMN085 |
| Plugs | | |
| P201 | 25055502 | NPLG-16P477 |
| P491 | 25055583 | NPLG-7P554 |
| P511,P512 | 25055493 | NPLG-2P468 |
| P601 | 25055499 | NPLG-10P474 |
| P602 | 25055501 | NPLG-14P476 |
| P603 | 25055500 | NPLG-12P475 |
| Socket | | |
| JL701a | 25050727 | NSCT-30P531 |
| Fuses | | |
| F904,F905 | 252051 |  6A ST-6 |
| Fuseholders | | |
| F904a,F905a | 250113 |  SN5051 |
| Clamp | | |
| P991 | 260224 | CP-1S |

HEADPHONE TERMINAL PC BOARD (NAETC-4188-5)

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|-------------|----------|---------------------------------|
| P504 | 25045255 | YKB21-5009, Terminal, headphone |


DISPLAY CIRCUIT PC BOARD (NADIS-4189-5)

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|------------------------|-----------|----------------------|
| ICs | | |
| Q702 | 22240624 | μ PD75212ACW-A30 |
| Q703 | 22240466 | μ PD17103CX-531 |
| Q705 | 22240211 | μ PD6345C |
| Q706 | 22240341 | BA6125 |
| FL tube | | |
| Q701 | 212115 | 11-BT-107GK |
| Transistors | | |
| Q707-Q709 | 2213284 | 2SC1740S-R |
| Q711,Q712 | 221282 | DTC144ES |
| Q713 | 2213640 | DTC123JS |
| Q715 | 2213510 | DTA114ES |
| Q716 | 2213830 | DTB113ZS |
| Opto. receiving module | | |
| U701 | 24130007 | GP1U571X |
| Diodes | | |
| D701,D702 | 224450623 | MTZ6.2C |
| D713,D714 | 223163 or | 1SS133 or |
| D717-D738 | 223205 | 1SS270A |


| CIRCUIT NO. | PART NO. | DESCRIPTION |
|---------------------|------------|-------------------------------------|
| Diodes | | |
| D740-D742 | 223163 or | 1SS133 or |
| D744-D748 | 223205 | 1SS270A |
| D743,D762 | 224450562 | MTZ5.6B |
| D752-D754 | 223163 or | 1SS133 or |
| D758 | 223205 | 1SS270A |
| L.E.Ds | | |
| D711,D712 | 225142 | SEL2913K |
| Coil | | |
| L701 | 233411K220 | NCH-1387 |
| Ceramic oscillators | | |
| X701 | 3010163 | CST4.19MGW |
| X702 | 3010154 or | CST8.00MT or |
| | 3010190 | CST8.00MTW |
| Capacitors | | |
| C701 | 353780109 | 1 μ F, 50V, Elect. |
| C703,C704 | 353741009 | 10 μ F, 16V, Elect. |
| C705 | 353780109 | 1 μ F, 50V, Elect. |
| C707 | 375524744 | 0.47 μ F \pm 5%, 50V, Plastic |
| C708 | 3000057 | 0.1F, 5.5V, Super |
| C710 | 353780109 | 1 μ F, 50V, Elect. |
| C711 | 353721019 | 100 μ F, 6.3V, Elect. |
| C715 | 353780109 | 1 μ F, 50V, Elect. |
| Switches | | |
| S701-S703 | 25035548 | NPS-111-S510 |
| S705-S718 | 25035548 | NPS-111-S510 |
| S721-S742 | 25035548 | NPS-111-S510 |
| Socket | | |
| JL701b | 25050728 | NSCT-30P532 |
| Plug | | |
| P702b | 25055512 | NPLG-5P487 |
| Holders | | |
| Q702a | 27190842 | LED 9 |
| D711a | 27190843 | LED 1 |

VOLUME CIRCUIT PC BOARD (NAAF-4190-5)

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|-------------|-------------|-------------|
| ICs | | |
| Q451 | 22240468 | LC7536 |
| Q453,Q454 | 22240247 or | BA15218N or |
| Q601,Q605 | 22240293 | NJM4558L-D |
| Q602 | 22240458 | NJM2175L |
| Q661 | 22240370 | M50198P |
| Q691 | 22240339 | LC7823N |
| Q692 | 22240270 | LC7822N |
| Q871 | 22240239 | TA7291S |
| Transistors | | |
| Q457,Q603 | 2213631 or | RN1241-A or |
| Q604 | 2213632 | RN1241-B |
| Diodes | | |
| D451,D661 | 223163 or | 1SS133 or |
| D662,D871 | 223205 | 1SS270A |








NOTE: THE COMPONENTS IDENTIFIED BY MARK  ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PART NUMBER SPECIFIED.

| CIRCUIT NO. | PART NO. | DESCRIPTION | RI/MR TERMINAL PC BOARD (NADG-4191-5) | | |
|-------------|--------------------|------------------------------------|--|--------------------|------------------------------------|
| | Ceramic oscillator | | CIRCUIT NO. | PART NO. | DESCRIPTION |
| X661 | 3010169 | CST3.27MGW002 | | IC | |
| | Coil | | Q762 | 222780053 | 78L05 |
| L661 | 233411K220 | NCH-1387 | | Transistors | |
| | Capacitors | | Q764-Q766 | 221282 | DTC144ES |
| C451,C452 | 354780229 | 2.2 μ F,50V,Elect. | | Diodes | |
| C457,C458 | 354761009 | 10 μ F,35V,Elect. | D761,D762 | 223163 or | 1SS133 or |
| C459,C460 | 354780229 | 2.2 μ F,50V,Elect. | D764,D765 | 223205 | 1SS270A |
| C461,C462 | 354761009 | 10 μ F,35V,Elect. | | Capacitors | |
| C463,C464 | 354781099 | 0.1 μ F,50V,Elect. | C767 | 354761009 | 10 μ F,35V,Elect. |
| C465,C466 | 374721024 | 1000pF \pm 5%,50V,Plastic | C770 | 374724724 | 4700pF \pm 5%,50V,Plastic |
| C467,C468 | 354744709 | 47 μ F,16V,Elect. | | Terminals | |
| C603-C608 | 354761009 | 10 μ F,35V,Elect. | P761 | 25045172 | HSJ-1003-01-020 |
| C609-C612 | 354781099 | 0.1 μ F,50V,Elect. | P762 | 25045293 | HSJ-1003-01-012 |
| C615,C616 | 374724734 | 0.047 μ F \pm 5%,50V,Plastic | | Socket | |
| C617,C618 | 374722234 | 0.022 μ F \pm 5%,50V,Plastic | P951a | 25050444 | NSCT-6P268 |
| C619-C622 | 354781099 | 0.1 μ F,50V,Elect. | | | |
| C623,C624 | 354780479 | 4.7 μ F,50V,Elect. | OPERATION SWITCH PC BOARD (NASW-4192-5) | | |
| C625-C629 | 353782299 | 0.22 μ F,50V,Elect. | CIRCUIT NO. | PART NO. | DESCRIPTION |
| C630,C632 | 354761009 | 10 μ F,35V,Elect. | S719,S743 | 25035548 | NPS-111-S510,Switches |
| C631 | 354786899 | 0.68 μ F,50V,Elect. | S744 | 25035548 | NPS-111-S510,Switch |
| C635,C648 | 374722224 | 2200pF \pm 5%,50V,Plastic | P702 | 25050456 | NSCT-5P280,Socket |
| C636 | 354724719 | 470 μ F,6.3V,Elect. | | | |
| C637 | 374724734 | 0.047 μ F \pm 5%,50V,Plastic | INPUT BALANCE VOLUME PC BOARD (NAETC-4193-5) | | |
| C638 | 374725624 | 5600pF \pm 5%,50V,Plastic | CIRCUIT NO. | PART NO. | DESCRIPTION |
| C639 | 354742219 | 220 μ F,16V,Elect. | R600 | 5104258 | N11RGLC250KWT15Z,Variable resistor |
| C640 | 354761009 | 10 μ F,35V,Elect. | | | |
| C641 | 374723324 | 3300pF \pm 5%,50V,Plastic | TUNER CIRCUIT PC BOARD (NARF-4194-5) | | |
| C642-C646 | 354761009 | 10 μ F,35V,Elect. | CIRCUIT NO. | PART NO. | DESCRIPTION |
| C649-C652 | 354761009 | 10 μ F,35V,Elect. | | Front end | |
| C661 | 354780109 | 1 μ F,50V,Elect. | TU001 | 240088 | FE337-A07 |
| C662,C669 | 374725624 | 5600pF \pm 5%,50V,Plastic | | ICs | |
| C664,C668 | 374721044 | 0.1 μ F \pm 5%,50V,Plastic | Q104 | 22240039 | LA1266 |
| C665 | 354744709 | 47 μ F,16V,Elect. | Q107 | 22240090 | LM7001 |
| C666,C667 | 354784799 | 0.47 μ F,50V,Elect. | Q201 | 22240242 | AN7470 |
| C671,C673 | 354721019 | 100 μ F,6.3V,Elect. | Q208 | 22240247 or | BA15218N or |
| C672,C674 | 374721044 | 0.1 μ F \pm 5%,50V,Plastic | | 22240293 | NJM4558L-D |
| C675 | 375524744 | 0.47 μ F \pm 5%,50V,Plastic | | Transistors | |
| C821,C822 | 354761009 | 10 μ F,35V,Elect. | Q102 | 2211723 | 2SC1923-O |
| C871 | 354721019 | 100 μ F,6.3V,Elect. | Q103,Q106 | 2213284 | 2SC1740S-R |
| | Resistor | | Q105 | 2212445 | 2SK365-GR |
| R481-R484 | 5144014A | N16RQL100KBT25F,Variable | Q108,Q109 | 2213510 | DTA114ES |
| | Sockets | | Q205,Q206 | 2212794 | 2SD1468-R |
| P611 | 2000556 | NSAS-6P512 | Q207 | 2213510 | DTA114ES |
| P612 | 2009990024 | NSAS-10P0048 | | Diodes | |
| P601a | 25050446 | NSCT-10P270 | D101,D102 | 223132 | 1K60 |
| P602a | 25050448 | NSCT-14P272 | D103 | 224450512 | MTZ5.1B |
| P603a | 25050447 | NSCT-12P271 | D201,D202 | 223163 or | 1SS133 or |
| | | | D206,D207 | 223205 | 1SS270A |
| | | | | Crystal oscillator | |
| | | | X104 | 3010158 or | XTL-7.2M |
| | | | | 3010141 | |

NOTE: THE COMPONENTS IDENTIFIED BY MARK  ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PART NUMBER SPECIFIED.

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|------------------------|------------|------------------------------------|
| Coils and transformers | | |
| L101 | 233401 | NFIF-4072 |
| L102 | 233402 | NFIF-4073 |
| L103 | 233411M022 | NCH-1375 |
| L151 | 232148 | NMRF-7050 |
| L152 | 232139 | NMIF-4062 |
| L201,L202 | 233355A | NMC-4059 |
| Ceramic filters | | |
| X101,X103 | 3010071 | SFE10.7MA5(RED) |
| X151 | 3010123 | SFZ-450JL |
| X152 | 3010076 | BFU-450C |
| Capacitors | | |
| C001,C108 | 354741019 | 100 μ F,16V,Elect. |
| C106 | 354784799 | 0.47 μ F,50V,Elect. |
| C107 | 354742209 | 22 μ F,16V,Elect. |
| C112 | 354780229 | 2.2 μ F,50V,Elect. |
| C113 | 354784799 | 0.47 μ F,50V,Elect. |
| C116 | 374722234 | 0.022 μ F \pm 5%,50V,Plastic |
| C117 | 374723334 | 0.033 μ F \pm 5%,50V,Plastic |
| C118 | 354780229 | 2.2 μ F,50V,Elect. |
| C119 | 353782299 | 0.22 μ F,50V,Elect. |
| C123 | 354721019 | 100 μ F,6.3V,Elect. |
| C124 | 354741019 | 100 μ F,16V,Elect. |
| C154 | 354780479 | 4.7 μ F,50V,Elect. |
| C155-C157 | 354761009 | 10 μ F,35V,Elect. |
| C159 | 374724734 | 0.047 μ F \pm 5%,50V,Plastic |
| C160 | 374721034 | 0.01 μ F \pm 5%,50V,Plastic |
| C161 | 353782299 | 0.22 μ F,50V,Elect. |
| C201 | 354744719 | 470 μ F,16V,Elect. |
| C202 | 354742209 | 22 μ F,16V,Elect. |
| C205 | 353782299 | 0.22 μ F,50V,Elect. |
| C206 | 354780109 | 1 μ F,50V,Elect. |
| C207 | 354780339 | 3.3 μ F,50V,Elect. |
| C208 | 370134714 | 470pF \pm 5%,100V,Plastic |
| C209 | 374724734 | 0.047 μ F \pm 5%,50V,Plastic |
| C211,C212 | 374721824 | 1800pF \pm 5%,50V,Plastic |
| C213,C214 | 354742209 | 22 μ F,16V,Elect. |
| C215,C216 | 354761009 | 10 μ F,35V,Elect. |
| C219,C220 | 374726224 | 6200pF \pm 5%,50V,Plastic |
| C222 | 354780229 | 2.2 μ F,50V,Elect. |
| C223 | 374721024 | 1000pF \pm 5%,50V,Plastic |
| C224 | 374724734 | 0.047 μ F \pm 5%,50V,Plastic |
| C225,C226 | 354761009 | 10 μ F,35V,Elect. |
| Resistors | | |
| R101 | 5210266 | N06HR 100KBC,Semi-fixed |
| R102,R202 | 5210267 | N06HR 200KBC,Semi-fixed |
| R201 | 5210261 | N06HR 5KBC,Semi-fixed |
| Terminal | | |
| P101 | 25060160 | NTM-4PDMN086 |
| Socket | | |
| P201 | 25050449 | NSCT-16P273 |

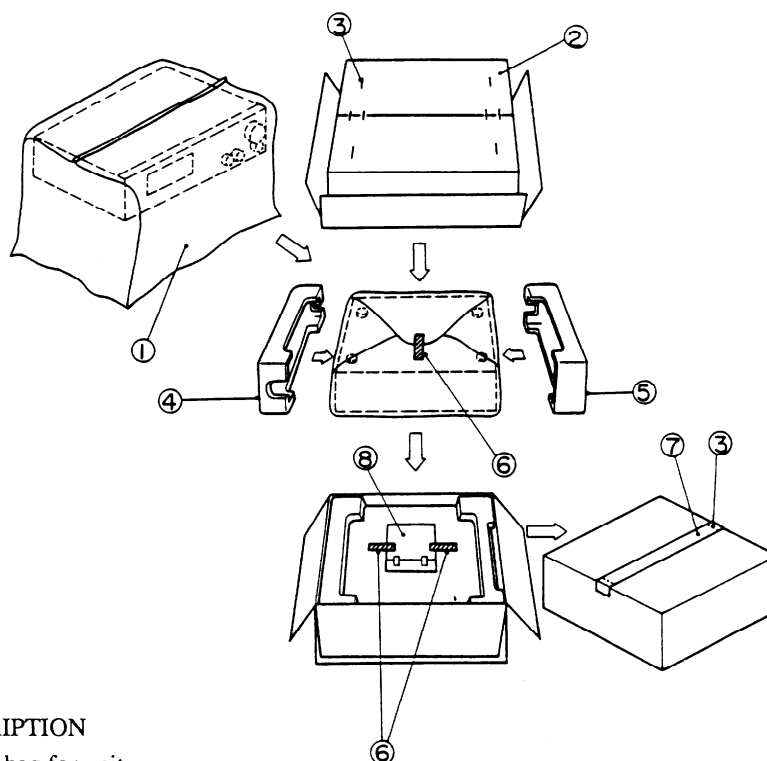
POWER SUPPLY CIRCUIT PC BOARD (NAPS-4195-5)

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|-------------------|-------------|--|
| Transistors | | |
| Q951 | 221282 | DTC144ES |
| Q952 | 2213650 | DTD113ZS |
| Diodes | | |
| D951-D954 | 22380032, | 1SR139-100, |
| | 22380035 or | GP104003E or |
| | 22380046 | AM01Z |
| D955 | 223163 or | 1SS133 or |
| D995,D996 | 223205 | 1SS270A |
| Power transformer | | |
| T902 | 2300670 |  NPT-1111D |
| Capacitors | | |
| C901 | 3500065A |  DE7150FZ103PAC400V/125V,IS |
| C952 | 354761019 | 100 μ F,35V,Elect. |
| Resistors | | |
| R901 | 431523355 |  3.3M Ω \pm 20%,1/2W,Solid |
| R951 | 442520824 | 8.2 Ω \pm 5%,1/2W,Metal oxide film |
| AC outlet | | |
| P902 | 25050409 |  NSCT-4P234 |
| Relay | | |
| RL901 | 25065248 |  NRL-1P15A-DC12-29 |
| Fuse | | |
| F901 | 252051 |  6A ST-6 <D/W> |
| Fuseholders | | |
| F901a | 250113 |  SN5051 |
| Plug | | |
| P951 | 25055497 | NPLG-6P472 |

VIDEO AND SUB AMPLIFIER PC BOARD (NAAF-4196-5)

| CIRCUIT NO. | PART NO. | DESCRIPTION |
|-------------|-------------|---|
| | ICs | |
| Q251 | 22240373 | BA7625 |
| Q571,Q572 | 22240467 | SI-18751 |
| Q881 | 22240247 | BA15218N |
| | Transistors | |
| Q252,Q253 | 2213354 | 2SA933S-R |
| Q573,Q574 | 2211732 or | 2SC1845-F or |
| | 2211733 | 2SC1845-E |
| Q883 | 2213510 | DTA114ES |
| Q884 | 2213631 or | RN1241-A or |
| | 2213632 | RN1241-B |
| | Diodes | |
| D251 | 223163 or | 1SS133 or |
| D253,D254 | 223205 | 1SS270A |
| D505,D506 | 223163 or | 1SS133 or |
| D571-D574 | 223205 | 1SS270A |
| | Coils | |
| L571,L572 | 231176 | S-1.3C |
| | Capacitors | |
| C251,C252 | 354780229 | 2.2 μ F,50V,Elect. |
| C253,C254 | 354724719 | 470 μ F,6.3V,Elect. |
| C255 | 354721019 | 100 μ F,6.3V,Elect. |
| C571,C572 | 354761009 | 10 μ F,35V,Elect. |
| C577,C578 | 354741019 | 100 μ F,16V,Elect. |
| C581,C582 | 374724734 | 0.047 μ F \pm 5%,50V,Plastic |
| C591,C592 | 354780229 | 2.2 μ F,50V,Elect. |
| C881,C886 | 354761009 | 10 μ F,35V,Elect. |
| | Resistors | |
| R581,R582 | 442520824 | 8.2 Ω \pm 5%,1/2W,Metal oxide film |
| R583,R584 | 4000059 | 0.22 Ω ,2W,Metal plate |
| | Relaies | |
| RL505,RL506 | 25065339 | NRL-2P5A-DC24-046 |
| | Terminal | |
| P251 | 25045339 | NPJ-4PDYE190 |
| P502 | 25060161 | NTM-4PDML087 |
| P506 | 25045302 | NPJ-1PDBL161 |
| | Plug | |
| P612a | 25055135 | NPLG-5P119 |
| | Sockets | |
| JL251 | 25050273 | NSCT-9P101 |
| JL571 | 25050272 | NSCT-8P100 |
| JL572,JL605 | 25050267 | NSCT-3P95 |

PACKING VIEW



| REF.NO. | PART NO. | DESCRIPTION |
|---------|---------------------|------------------------------------|
| 1 | 29100034A | Styrene bag for unit |
| 2 | 29052441Y | Master carton box |
| 3 | 282301 | Sealing hook |
| 4 | 29091449B | Pad R |
| 5 | 29091448B | Pad L |
| 6 | 261504 | Adhesive tape |
| 7 | 29110071 | Damplon tape |
| 8 | Accessory bag ass'y | |
| | 29341755AY | Instruction manual |
| | 29341756Y | Instruction manual <C> |
| | 292111 | FM antenna |
| | 232140 | NMA-3057,AM loop antenna |
| | 2010200 | Connection cord |
| | 3010054 | UM-3,Two batteries |
| | 24140237Y | RC-237S,Remote control transmitter |
| | 29365019A | Warranty card <N> |
| | 29358002J | Service station list <N> |
| | 29100097 | Styrene bag for accessory |

NOTE: <N>:U.S.A. model
<C>:Canadian model

ONKYO CORPORATION

International Division: Onarimon Yusen Bldg., 23-5, Nishi-Shimbashi 3-chome, Minato-ku,
TOKYO 105, JAPAN Tel: 03-432-6987 Fax: 03-436-6979

ONKYO U.S.A CORPORATION

200 Williams Drive, Ramsey, N.J. 07446, U.S.A.
Tel: 201-825-7950 Fax: 201-825-8150